THE ROLE OF ACCULTURATION IN NUTRITION BEHAVIORS AMONG LOW INCOME HISPANIC WOMEN LIVING IN TEXAS

A Dissertation

by

NELSON ALBERTO ATEHORTUA

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2012

Major Subject: Health Education

The Role of Acculturation in Nutrition Behaviors among Low Income Hispanic Women Living in Texas

THE ROLE OF ACCULTURATION IN NUTRITION BEHAVIORS AMONG LOW INCOME HISPANIC WOMEN LIVING IN TEXAS

A Dissertation

by

NELSON ALBERTO ATEHORTUA

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Approved by:

Chair of Committee,	Ellisa Jones-McKyer
Committee Members,	Patricia Goodson
	Buster Pruitt
	Donald Sweeney
Head of Department,	Richard Kreider

August 2012

Major Subject: Health Education

ABSTRACT

The Role of Acculturation in Nutrition Behaviors among Low Income Hispanic Women Living in Texas. (August 2012)

Nelson Alberto Atehortua, B.S., University of Cartagena, Colombia; M.S., Northern University, Colombia; M.S., Western Kentucky University

Chair of Advisory Committee: Dr. Ellisa Jones-McKyer

The purpose of this study was to determine the role of acculturation in the food consumption patterns of low income Hispanic women living in Texas and enrolled in the Women, Infants, and Children (WIC) Program by testing the following hypotheses: a) There are significant differences in consumption of fruit and vegetables by selected socio-demographic variables; and, b) less healthy food consumption patterns are associated with higher levels of acculturation in health-related research involving low-income Hispanic women living in Texas.

A secondary-data analysis of the responses to the Texas Food & Nutrition (TEXFAN) questionnaire was performed. TEXFAN is a 122-item survey designed to measure WIC participants' consumption behaviors and to assess the impact of new food packages in Texas' WIC program. A total of 3,336 adult, non-pregnant women self-identified as having Hispanic ethnic background of all races were considered for this study.

Analysis of Variance and Kruskal-Wallis tests showed significant differences in nutritional practices among Hispanic women for age, educational attainment, employment status, race, area of residence, and acculturation. Logistic Regression analysis confirmed the hypothesis that lower levels of acculturation are associated with healthier food consumption patterns. The majority of respondents (70.7%, *N*=2,358) did not consume the recommended five servings of fruits and vegetables a day; therefore, do not have healthy patterns of food consumption. Consequently, the majority of respondents (70.0%, *N*= 1,709) has a weight statuses above normal and at a higher proportion than women in the State of Texas and the nation.

Acculturation continues to interest social and behavioral researchers but variations on conceptualization, definition, operationalization, and measurement negatively impact generalizability and applicability of results. Interventions not considering acculturation are not likely to be successful. Research has to include community, ecological, cultural and contextual factors (e.g., machismo, accessibility to sidewalks, availability of fresh healthy foods, etc.).

Development of effective intervention programs should be aimed to increase consumption of healthy food and an adherence to the recommendations of the "Healthy Plate" and the "Dietary Guidelines for Americans 2010" among Hispanics. Also, interventions should generate necessary skills among Hispanics for empowering them to sustain proper nutritional behaviors and overcome barriers.

DEDICATION

To my beloved wife Maria Ines, who always gave me the very best of her love, patience, and support helping me to stay focused on our family's goals and to holding on to my faith in the middle of some difficult moments. I couldn't have made it without you and can't really tell you how thankful I am and how much I love you.

To my son Juan Sebastian, the bravest young man I've ever seen, as smart and resourceful as Ulysses, the Greek hero. He has successfully overcome so many changes and challenges with a smile and a loving positive attitude; you rock buddy! I am sure you will succeed in life with all the talents you have, I'm very proud of you, never forget that.

To the Bradley family; Scott and Natalia who have given me their love and support bringing a new perspective to my life through the wonderful gift of gorgeous Isabella, my granddaughter, I keep on dreaming about a future close to you.

To my mother, Carmen, who instilled in me the values of persistence and hard work by her example; this accomplishment is a fruit of that. To my brother, Michel, he is a big fan and one of the enthusiastic motivators. I wish I could have been closer in the hard times. To my grandmother, Eva Steffens, I am sure she would have been very happy to see me wearing the doctoral cap and gown while walking the aisle to get my diploma thinking that: "The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands at times of challenge and controversy." Dr. Martin Luther King Jr., Strength to Love, 1963.

ACKNOWLEDGEMENTS

I want to thank my committee chair, Dr. E. Lisako Jones McKyer, and my committee members, Dr. Patricia Goodson, Dr. Buzz Pruitt, and Dr. Don Sweeney, for their guidance and support throughout the course of my doctoral program and particularly for this research project.

I want to give special thanks to Steve & Chris Nagy who helped me believe this was possible, also want to thank my friends, colleagues, faculty and staff at the Office of Graduate Studies, the Department of Health and Kinesiology, the College of Education and Human Development, and the former Center for the Study of Health Disparities (renamed Transdisciplinary Center for Health Equity Research) for making my time at Texas A&M University a great experience.

Especial thanks to Thelma Isenhart and Mary Beth Henthorne, they were like a family away from home for all of us in the Atehortua family. Tami Hawkins, you also have a piece on this. I also want to extend my gratitude to Dr. Peter & Elsa Murano and the Institute for Obesity Research and Program Evaluation (IORPE), which kindly provided the survey data for this study. .

Many thanks to Dr. Bruce Thompson and Dr. Linda Castillo for introducing me to the wonderful worlds of advanced statistics and acculturation respectively. Thanks to Dr. Steve Nagy, Steve Dorman, Dr. B. Lee Green, and Dr. Robert Armstrong who, among others, kindly decided that HKLN was the right place for me to go down PhD Avenue.

Thanks also to Andrea Ford and Carol Assmann for their helping hands in the English language matters. Finally, I want to give my deepest appreciation to Texas A&M University's Graduate Diversity Fellowship that made this entire story possible.

NOMENCLATURE

ABNB	Area of Residence Border or non-Border
ACCU	Level of Acculturation
AGES	Age Groups
AH	Asian Hispanic
ANH	Asian non-Hispanic
ANOVA	Analysis of Variance
Art.Sweet.Bv.	Artificially Sweetened Beverages
ATSB	Artificially Sweetened Beverages
AUVR	Area of Residence Urban or Rural
BFFV	Buy Fresh Fruits and Vegetables
BH	Black Hispanic
BMI	Body Mass Index
BNH	Black non-Hispanic
Bonferroni	Correction of p-value to prevent Type I Errors
CFA	Confirmatory Factor Analysis
Corn Trt.	Corn Tortillas
DNWTA	Do not want to answer
DSSD	Sugar Sweetened Beverages
ECTT	Eat Corn Tortillas
EDAT	Level of Educational Attainment

EFA	Exploratory Factor Analysis
EMPY	Employment Status
ETBR	Eat Brown Rice
ETFF	Eat French Fries
ETFR	Eat Fruit
ETOM	Eat Oatmeal
ETOV	Eat other Vegetables
ETPO	Eat Potatoes
ETVE	Eat Vegetables
ETWB	Eat White Bread
ETWR	Eat White Rice
EWFT	Eat White Flour Tortillas
EWGB	Eat Whole Grain Bread
EWWT	Eat Whole Wheat Tortillas
F&V	Fruits and Vegetables
GED	General Educational Development
H	Kruskal-Wallis Test
HPCJ	Drink Fruit Juice
HRA	Hierarchical Regression Analysis
HSG	High School Graduate
Levene Test	Test for Homogeneity of Variances in ANOVA
MFVG	Prepare Meals with Fruits and Vegetables

MLR	Multivariate Logistic Regression
MQS	Methodological Quality Score
NAH	Native American Hispanic
NANH	Native American Non-Hispanic
Oth. Vgtbls	Other Vegetables
PIH	Pacific Islander Hispanic
PINH	Pacific Islander non-Hispanic
r	Measure of Effect Size for Mann-Whitney test
r	Pearson's Correlation Coefficient
R	Coefficient of Determination
RACE	Ethnic Subgroup
SEEF	Level of Self-Efficacy
Sig.	P-value, Level of Significance
SRL	Systematic Review of the Literature
Sugar.Swt.Bv.	Sugar Sweetened Beverages
TEXFAN	Texas Food & Nutrition Questionnaire
Tukey	Post-Hoc Test in ANOVA when Equal Variances are assumed
U	Mann-Whitney Test
ULR	Univariate Logistic Regression
WH	White Hispanic
Whl Grn. Brd	Whole Grain Bread
Whl Wht. Trt.	Whole Wheat Tortillas

WHR	Waist-to-Hip Ratio
Wht. Bread	White Bread
Wht. Flr. Trt.	White Flour Tortillas
Wht. Rice	White Rice
WIC Program	Women, Infants & Children Program
WNH	White non-Hispanic
WTST	Weight Status
z	Standardized Score following a Z Distribution
$\eta 2$	Eta-Squared
Φ	Measure of Effect Size for Kruskal-Wallis Test
$\chi 2$	Chi-Squared

TABLE OF CONTENTS

CHAPTER Page

Page

LIST OF FIGURES

LIST OF TABLES

TABLE Page

TABLE Page

CHAPTER I

INTRODUCTION

Statement of the Problem

Hispanics are the largest minority group in the United States with 50.5 million people representing 16.3% of the total American population (US Census, 2011a). Projections estimate that this group will represent one third (132.8 million) of the American Population by 2050 (US Census, 2011b). In Texas, Hispanics represent about 40 percent of the population and estimates project that Hispanics will be more than 50% of the Texas population sometime between 2025 and 2035 (US Census, 2004; US Census, 2006; Texas State Data Center, 2011).

Coupled with changing population characteristics, the prevalence of being classified as overweight and obese has increased steadily among the US population over the past 40 years (Flegal, Carroll, Ogden & Curtin, 2010). The percentage of obese adults has more than doubled between the years of 1976 and 2006 (Flegal et al., 2010). More recently age-adjusted prevalence rates for obesity and extreme obesity have plateaued, and there have been no significant changes in the prevalence of obesity among adults between 2007 and 2010 (Flegal, Carroll, Kit & Ogden, 2012; Ogden, Carroll, Kit, & Flegal, 2012a; Ogden, Carroll, Kit, & Flegal, 2012b).

This dissertation follows the style of *Health Education and Behavior*.

Significant increases of obesity prevalence among Hispanic women and non-Hispanic black women continue to be problematic (Flegal et al., 2012a; 2012b). Unlike the national profile there is greater prevalence of obesity in Texas, where more than two thirds of adults are either overweight or obese. Furthermore, the prevalence of being overweight and obese for both sexes is more pronounced among Hispanics (74.0%) and African Americans (71.3%) with even greater prevalence among Hispanic women (CDC – BRFSS, 2009a; Flegal, et al., 2010; CDC, 2004). Clearly, based on current data, the rates of obesity are worsening for this group (McCuster, Sanchez, Murdock, Hoque & Huang, 2004; Flegal et al. 2010).

Gender disparities in obesity

Serious disparities emerge when data on distribution of overweight and obesity are analyzed by sex and ethnicity (Flegal, et al., 2010; Wang & Beydoun, 2007). Obesity has been consistently more prevalent among women than men (Table 1, Figure 1).

Table 1. Prevalence of obesity among U.S. adults aged 20 and over by sex and race/ethnicity for years 1999 to 2008.

Characteristic	NHANES 1999-2000	NHANES 2001-2002	NHANES 2003-2004	NHANES 2005-2006	NHANES 2007-2008
		Men			
All	27.5	27.8	31.1	33.3	32.2
Non-Hispanic white	27.3	29.1	31.1	33.1	31.9
Non-Hispanic black	28.1	27.9	34.0	37.2	37.3
Mexican American	28.9	25.9	31.6	27.0	35.9
		Women*			
All	33.4	33.3	33.2	35.3	35.5
Non-Hispanic white	30.1	31.3	30.2	32.9	33.0
Non-Hispanic black	49.7	48.3	53.9	52.9	49.6
Mexican American	39.7	37.0	42.3	42.1	45.1

Note: * Pregnant females are excluded.
Source: Flegal, Carroll, Ogden & Curtin, 2010.

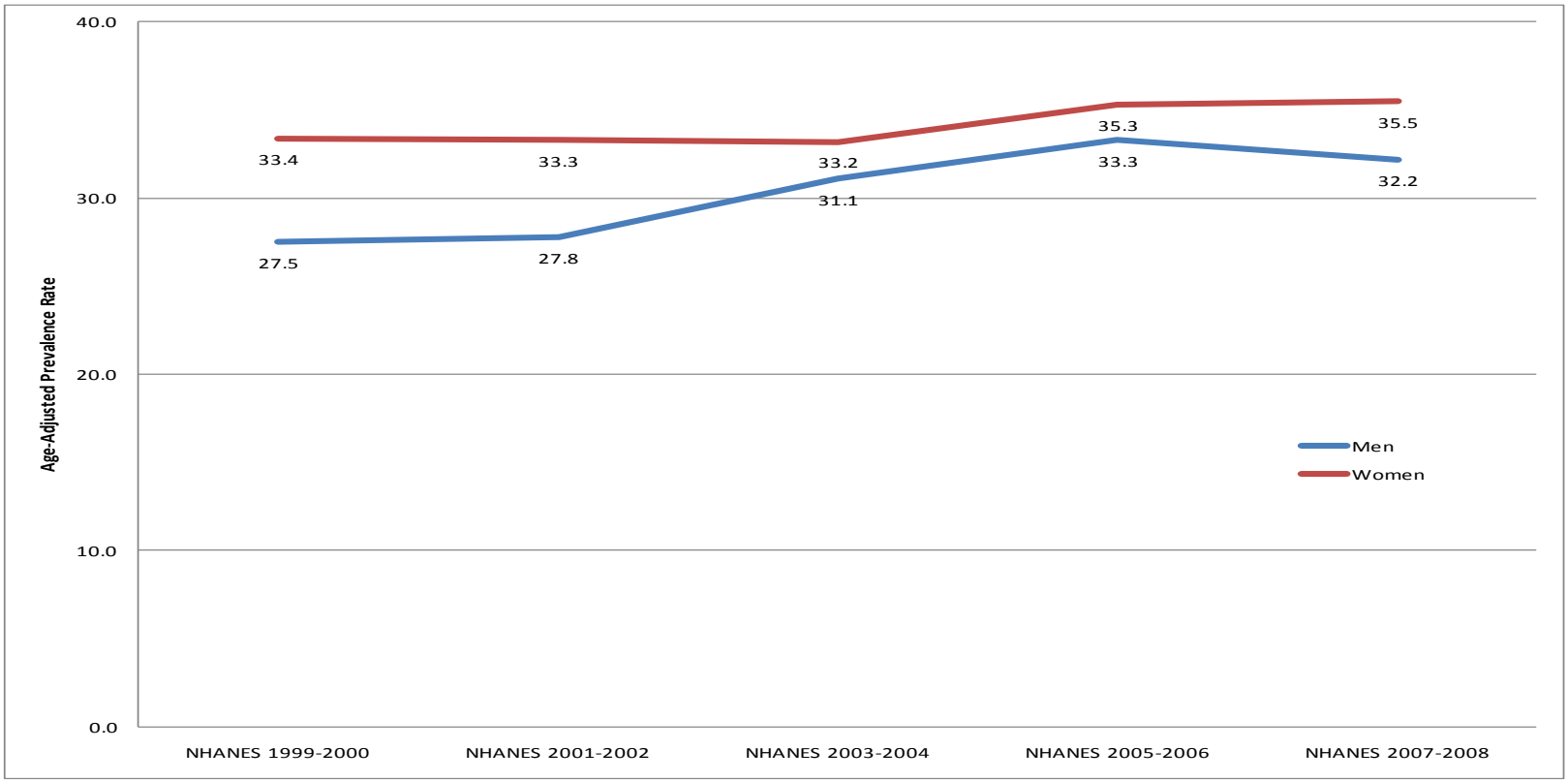


Figure 1. Prevalence of obesity among U.S. adults aged 20 and over by sex for years 1999 to 2008.
Source: Flegal, Carroll, Ogden & Curtin, 2010.

Among women, (Figure 2), Non-Hispanic Black females were significantly more likely than Mexican Americans to be obese while the latter were also significantly more likely to be obese than Non-Hispanic White women (Flegal et al., 2010). It is clear that Non-Hispanic White females have the lowest prevalence rates and are significantly less likely to be classified as obese as Non-Hispanic Blacks and Mexican American women (Table 1, Figure 2).

Among the major ethnic groups, the prevalence rates of obesity for non-Hispanic Black women have been decreasing since peaking in 2003 while rates for Hispanic females have been steadily increasing (McCuster, et al., 2004; Flegal et al., 2010). Among adolescents and children, significant increases in the prevalence of being classified as overweight and obese has occurred across all ethnic groups (Ogden, Carroll, Kit & Flegal, 2012a; Ogden, Carroll, Curtin, McDowell, Tabak et al., 2006) with the highest prevalence of obesity for Hispanic and African American children (Ogden et al., 2012a; Ogden, Flegal, Carroll & Johnson, 2002). Since obesity is a major risk factor in heart disease, cancer, and diabetes, the higher prevalence of obesity among Hispanics puts them at much greater risk for these diseases (CDC, 2010). Hispanic adults, for instance, are twice as likely than non-Hispanic white adults to have a diagnosis of diabetes; they are 1.5 times as likely as non-Hispanic Whites to die, and 1.5 times to start treatment for end-stage renal disease related to diabetes (CDC, 2009b; 2011a; 2011b).

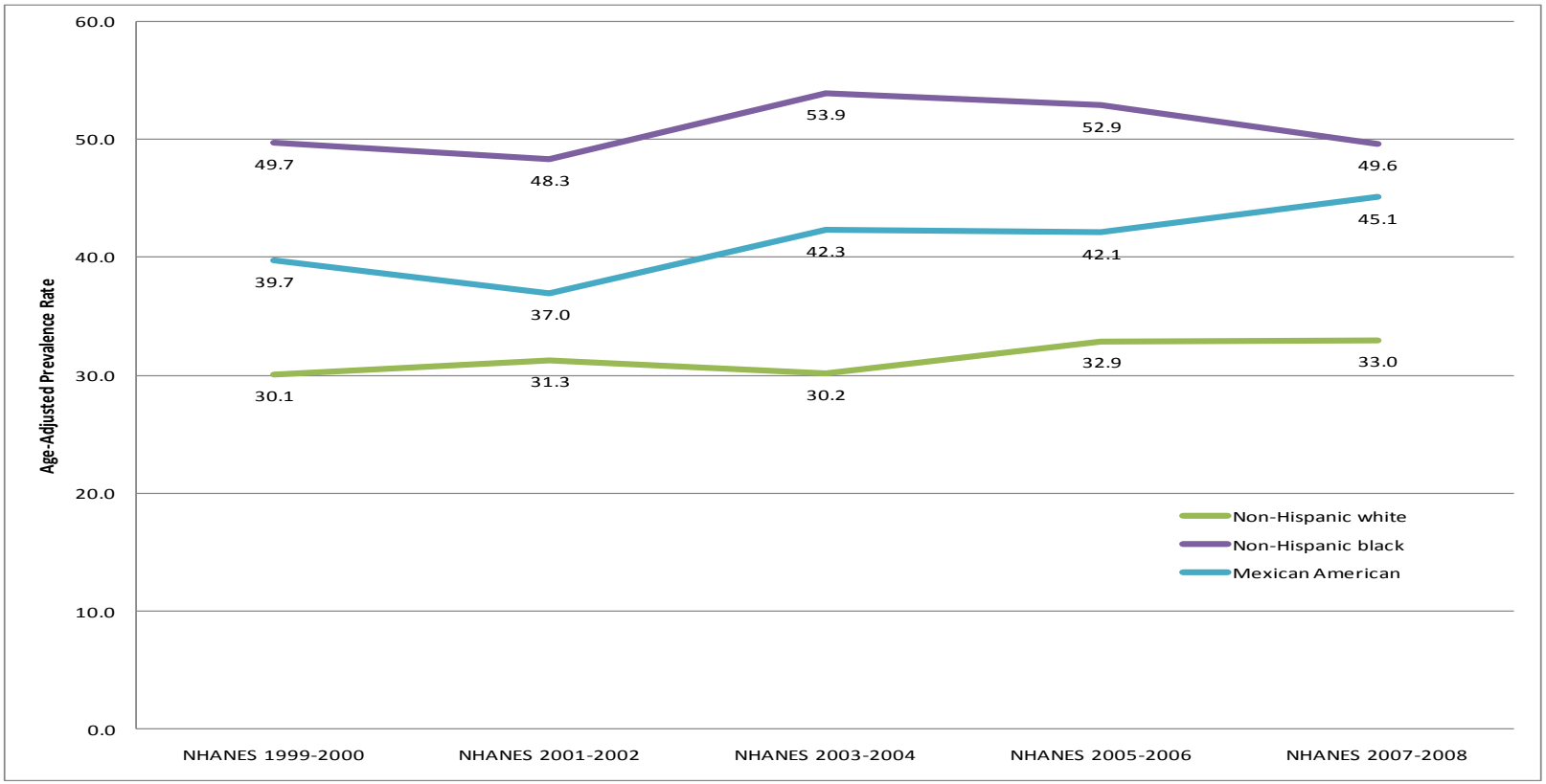


Figure 2. Prevalence of obesity among U.S. adult women aged 20 and over by ethnicity for years 1999 to 2008. Source: Flegal, Carroll, Ogden & Curtin, 2010.

Socio-Economic Status factors (SES) and associations with obesity

Age, gender, and ethnic background in conjunction with socio-economic factors have been identified as risk factors for obesity (Singh, Siahpush, Hiatt & Timsina, 2011; Singh & Siahpush, 2002). A number of measures have been used to assess level of SES in conjunction with obesity classifications. These include occupation (Choi, Schnall, Yang, Dobson, Landsbergis, Israel, 2010; King, Fitzhugh, Bassett, McLaughlin, Strath, et al., 2001; Power & Moynihan, 1988), income (Flegal, Carroll, Kuczmarski & Johnson, 1988; King et al., 2001) or educational attainment (Flegal, et al., 1988; Zhang & Wang, 2004). It is consistently reported that respondents with low levels of SES (regardless of the measure) have higher prevalence rates of obesity (King et al., 2001; Zhang & Wang, 2004; Lovasi, Hutson, Guerra & Neckerman, 2009).

It is well established that lower income places individuals at risk for obesity. Among ethnic groups, Hispanic households are at a greater risk for lower income than their white non-Hispanic counterparts. With regard to income, Hispanic males with full time employment earned 35% less than the average income for males in the nation ($ 42,210); and Hispanic women earn even less ($ 24,738) (US Census, 2006).

Another risk factor for weight increases is food insecurity. Evidence suggests that weight increases are greater among women experiencing food insecurity than women who do not have this characteristic (Adams, Grummer-Strawn, Chavez, 2003). This risk factor has greater potential influence among Hispanic households since more than one quarter have demonstrated some degree of food insecurity whereas only 15% of all US households faced food insecurity. In other words Hispanics households

experienced food insecurity 40% more than average households (Nord, 2009; Coleman-Jensen, Nord, Andrews & Carlson, 2011).

Hispanic women and the WIC program

Hispanics are the single largest ethnic group participating in the WIC Program. USDA surveillance has shown that 41.2% of all WIC recipients in the United States were Hispanics (USDA, 2010a; USDA, 2010b). State surveillance data for Texas WIC participation shows that Hispanics comprise more than half (60.4%) of all WIC recipients (USDA, 2008).

A committee review (IOM, 2006) of the WIC Food Packages, Food and Nutrition Board recommended that the USDA revise WIC Food Packages and align them to the 2005 Dietary Guidelines for Americans (USDA, 2005) in addition to aligning them to the Practice Infant Feeding Guidelines of the American Academy of Pediatrics (Committee to Review the WIC Food Packages Food and Nutrition Board, 2006). Subsequently, these recommendations were accepted by the USDA in 2007 (USDA Federal Register, 2007) and October 1st was set as the deadline for implementation by all the States across the nation (USDA Federal Register, 2008).

In an effort to best prepare for the pending food package changes and to better align services to needs of constituents, the Texas Department of State Health Services sponsored several studies to help them make informed decisions regarding protocols and policies. Among these were attempts to better understand cultural food preferences. The results of these preliminary studies are reflected in the development and

implementation of the Texas Food and Nutrition (TEXFAN) study and questionnaire, as can be seen in Appendix A (McKyer, Vaughan, Murano, Girimaji, Baxter et al, 2010).

Texas Food and Nutrition (TEXFAN) study

The Texas Food and Nutrition Questionnaire (TEXFAN-Q) is a 122–item questionnaire developed by the Institute for Obesity Research and Program Evaluation (IORPE), the Texas A&M AgriLife Research, and the Texas Department of State Health Services WIC Program to gather data regarding food preferences, nutritional general practices, measure consumption behaviors, and to assess the impact of new food packages among participants in the Texas' WIC program.

The survey was developed and tested for validity and reliability of data generated. Details on the development and testing of the TEXFAN questionnaire are described by McKyer and collaborators. (McKyer, et al., 2010).

The questionnaire is divided into four sections: Family (6 questions), Adult (45 questions), Infant (37 questions), and Child (33 questions). This survey measures demographics, food preferences, and dietary habits of WIC participants and their offspring receiving WIC products. TEXFAN-Q includes respondents' self-reported information on age in years, height in feet and inches, and weight in pounds.

TEXFAN-Q was administered at all WIC agencies in the State (McKyer, et al, 2010). The data collected from this questionnaire provides a unique opportunity to gain additional insight on acculturation issues; with particular focus on Hispanic populations.

Behavioral and cultural considerations

Behavioral factors

Behavioral factors influenced by culture may provide insights on differences between people of the same ethnic background but differing on birthplace. There is evidence indicating that foreign-born people consume more fruits and vegetables than people born in the U.S. for the same ethnic groups (Dixon, Sundquist & Winkleby, 2000). For example, Hispanic immigrants were 48% less likely to be obese than their U.S. born counterparts (Singh & Hiatt, 2006).

An association helping to explain this phenomenon is the behavior of U.S.-born individuals who have shown increased consumption of soft drinks, snack foods and fast food, coupled with inadequate consumption of vegetables and fruits when compared to foreign-born individuals (Siega-Riz, Popkin & Carson, 2000; Briefel & Johnson, 2004). Additional behavioral considerations such as patterns of physical activity and acculturation of behavioral risk factors deserve further analysis in their role in the obesity epidemic that seems to be disproportionately impacting Hispanics (Wang & Beydoun, 2007).

Cultural factors

Hispanics/Latinos share a set of cultural values and beliefs with variations due to differences in national origin, generation, educational attainment, socio-economic status, social role, language, family ties and level of acculturation to the American culture. These cultural values and beliefs have an important influence over decisions made by Latinos.

In general, Hispanics/Latinos identify themselves with a collectivist culture view in which a higher value is placed on the family and the larger community than on the individual. Interpersonal relationships are important, as well as the interplays between individuals with family members and friends in the environment (Tann, 2005; Chong & Baez, 2005; Gloria, Ruiz, & Castillo, 2003; Triandis & Suh, 2002; Torres, 2000; Ohbuchi, Fukushima, & Tedeschi, 1999).

Among Hispanics, family is really important, the definition of nuclear family is broader than the American concept; not only consisting of the immediate family; father, mother, and siblings; but include also grandparents, aunts, uncles, cousins, and often, members unrelated by blood like close friends that are like brothers or sisters. This concept of nuclear family generates Latino households where more than 2 generations can live together (Purnell & Paulanka, 2003; Tann, 2005).

Indeed, someone may be included in the concept of family in spite of having no blood or legal ties at all (Torres, 2000; Chong & Baez, 2005). This strong commitment with family is known as Familism (Triandis, Marin, Lisansky & Betancourt, 1984). An individual has a responsibility to keep loyalty and solidarity, interdependence, affiliation, cohesiveness, and cooperation with other members of the family; important decisions are generally made in the middle of family meetings (Santiago-Rivera, Arredondo & Gallardo-Cooper, 2002; Comas-Diaz, 1997; Marin & Marin, 1991; Sabogal, Marin, Otero-Sabogal, Marin, Perez-Stable, & Marin 1987; Marin & Triandis, 1985).

Hispanics have a strong sense of religion. Religion is a source of spiritual strength for facing life challenges. Sometimes, depending on education and socio-

economic status, religiosity may be associated with health-related attitudes and actions. Indeed, religiosity has been identified as a protective factor among Hispanics for mental disorders, alcoholism, and hypertension (Beyene, Becker, & Mayen, 2002; Peragallo, 1996; Magaña & Clarck, 1995).

Personal contact is very important as a way to show appreciation, friendship, or any type of affection for another person. When Latinos bring in food as a personal gesture, it is very important that the receptor accepts the food. Personal space has a different conception, is more expressed through non-verbal cues; in general, Latinos prefer to remain close, to move their hands, and to make facial expressions. These are communication styles very different to those prevalent in the US culture. Time also has a different concept and being on time is not really important, being late is not an issue (Gelman, 2004; Uber-Grosse, 2001; Gutierrez, Yeakley, & Ortega, 2000; Garrison, Roy, & Azar, 1999).

Hispanics have a broad conception of health that is associated to a larger community and not confined to the boundaries of the individual; religiosity, as mentioned before, influences conceptions about health but also, for instance in the Mexican culture, there are imbalances, dislocations, magical or supernatural causes of disease and healing. Strong emotional states, envy, energies, “mal de ojo”, are also counted among causes for diseases. The arsenal of therapeutic weapons counts in herbal remedies, prayers, omens, amulets. Traditional healing systems run by curanderos, santeros, or chamanes offer alternatives to western traditional medical systems (Tann, 2005; McCarthy, Ruiz, Gale, Karam, & Moore, 2004).

Santiago-Rivera (2002) noted that this syncretism "symbolize the blending of religious, primarily Catholic, and indigenous beliefs and traditions in the treatment of physical and psychological health states" (p. 48). People's beliefs about the dyad health/disease are moderated by education level, predominant culture system values, and socialization. Practices associated with folk and traditional medicine change among Hispanics from one national group to another, and from one generation to the next (Molina, & Aguirre-Molina, 1994).

Latinos value education very much, Latino immigrant parents provide strong support for education; similarly, parents usually have a strong involvement on education achievements and college-going decision. Hispanic parents usually look for positive and encouraging relationships between them, teachers, and students. Educational environments with guiding purposes, consistent messages, and consistency between beliefs and practices are the most appropriate for Latinos; further improvements are gotten when cultural knowledge is supported both at home and in the community (Miranda, Bilot, Peluso, Berman & Van Meek, 2006; Auerbach, 2006; Jesse, Davis, & Pokorny, 2004; Vazquez, & Rosa, 1999).

Latinos are also perceived as hard-working people with high work ethics and not being ashamed of doing certain labors (Chong, 2005; Torres, 2000). Respect is crucial: Elders, clergy, doctors, and authority are all persons deserving of the highest level of respect. They are called by their last names because Hispanics do not call authority figures by first names authority figures. Firm handshaking is also a way to convey a message of respect. (Chong, 2005; Torres, 2000).

Hispanics consider sympathy (good manners and pleasant) an important culture value and a part of the general Cosmo vision (Marin & Marin, 1991; Levine & Padilla, 1980); by encouraging smooth communication and cooperation Hispanics guarantee an assertive way of communications (Marin, 1992). Latinos value warm and friendly interpersonal relationships, which demand respect and dignity toward the other, in a study of sympathy among navy recruits, it was found that Latinos valued significantly more respect, loyalty, dignity, and cooperation than non-Latinos (Triandis & Suh, 2002; Triandis, 1984).

Machismo and Marianismo are confounded as the dominant and most preeminent culture values of Latino culture, the misconception arises from the image of males dominating, subjugating, females. Machismo refers actually to males as the dominant figures and the primary decision makers. Marianismo is the counterbalance figure, locating decisions about family health issues primarily in the hands of women. (Miranda et al., 2006; Vazquez, 1999). Last but not least the value of trust that crossover all other relationships becoming a main axis in Latino culture. Building trust with Latinos takes time usually over an extended period of time because it is about long-term relationships (Tann, 2005; Chong, 2005; Torres, 2000).

Finally, acculturation has a fundamental moderator effect over the mentioned cultural values and beliefs in terms of individual performance, social networking, stress management and family cohesion. It has been found that the more acculturated the higher the prevalence for depression and the lower the effectiveness of coping

mechanisms and family cohesion (Finch & Vega, 2003; Arcia, Wieland, Weiss, Sullivan, Nigon, 2001; Lopez, Haigh, & Burney, 2004; Miranda & Matheny, 2000).

Migrants committed to their goals and accepting challenges are better prepared supporting better the migration experience (Lopez, Haigh, Burney, 2004). On the other side, lack of social support networks can make newly immigrants susceptible to stress situations that are aggravated by the loss of native culture and environment.

Acculturation and health among Hispanics in the United States

Acculturation is not a new concept. Previously, since the 1940s, Lewin and Child described acculturation as the reaction of those in the minority to continuous contact with the dominant group or with those in the majority (Lewin, 1948; Child, 1970). Acculturation was later defined as the process through which people of a given culture adopt values and beliefs of a new culture (Teske & Nelson, 1974).

In the 1980s acculturation was conceptualized as a continuum between the cultures of origin moving towards the new host culture without necessarily maintaining adherence to the original culture (Cuéllar, Harris & Jaso, 1980). More recently, the definition of acculturation has incorporated not just the adoption of value systems, but also incorporated the changes in values and behaviors made by individuals in one culture as the result of contact with another one (Burnam, Telles, Kamo, Hough & Escobar, 1987). It is clear that conceptualization of acculturation has changed across time.

Measurement of acculturation has had some challenges. It has been measured using unidimensional, assimilation, or bidimensional approaches (Ryder, Alden, & Paulhus, 2000; Nguyen & von Eye, 2002). Measurement of acculturation as a single

dimension may utilize birthplace, years living in the United States, generational status, cultural knowledge, language preference at home, language proficiency, and language use (Chiriboga, 2004; Ayala, Baquero & Klinger, 2008).

Some researchers have conceptualized acculturation allowing for classification in high, medium, and low levels of identification by combining scales for two or more dimensions (Oetting & Beauvais 1990 & 1991; Marin & Gamba, 1996). This view recognizes that it is possible to get immersed in a host culture without cutting ties to the culture of origin (Berry, Kim, Minde & Mok, 1987; Marín & Gamba, 1996; Ryder et al., 2000). Such approaches use measures such as a combination of language use and language proficiency to measure levels of acculturation of research subjects (Berry et al, 1987; Birman, 1994; Birman, Trickett & Vinokurov, 2002). This type of conceptualization and empirical measurement of acculturation is also called bi-dimensional (Cabassa, 2003).

Bi-dimensional measurement of acculturation allows for increases in measurement sensitivity (Figure 3, Oetting & Beauvais, 1991; Marin & Gamba, 1996; Cuellar, Arnold & Maldonado, 1995). Evidence indicates that bi-dimensional measurement of acculturation identifies that greater involvement in the host culture is not associated with a reduction with the identification with values of the original culture (Costigan & Su, 2004) whereas does not implicate, as linear approaches clearly do, that the adoption of the new culture happens at the expense of the culture of origin (Dao, Teten, & Nguyen, 2011).

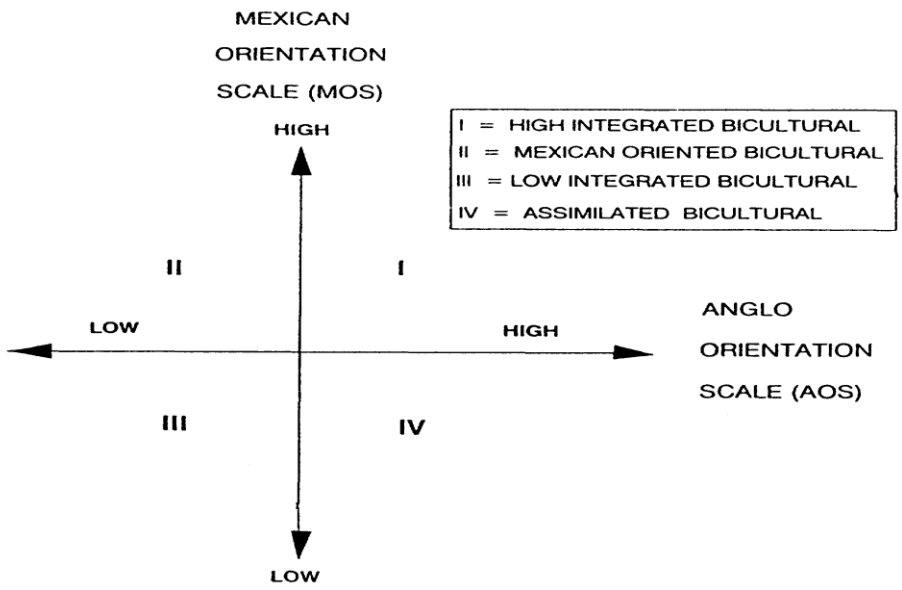


Figure 3. Bicultural classification frame.
Source: Cuellar, Arnold, & Maldonado, 1995; page 278.

Others have conceived multidimensional models focusing on cultural knowledge, language and ethnic preferences. This perspective surmises that there are multiple dimensions acting simultaneously, and therefore implying that acculturation has to be measured accordingly (Olmedo & Padilla, 1978; Cuellar, et al., 1980; Marin, Sabogal, Marin, Otero-Sabogal & Perez-Stable, 1987; Birman, 1994; Lara, Gamboa, Kahramanian, Morales & Hayes-Bautista, 2005). Given that acculturation impacts the values and mores that in turn guide behaviors, researchers trying to understand health issues and their implications for health services among Hispanics have recognized that it is an important construct that needs additional research (Yamada, Valle, Barrio & Jeste, 2006).

A further consideration in conceptualizing acculturation is the wide variation in the degrees of acculturation. This may range from individuals who are completely assimilated/integrated into the mainstream culture, to those who are bicultural and balanced, and finally at those who fully adhere to their original culture (Cabassa, 2003; Lara et al 2005). Such a perspective reflects a "long-term, fluid process in which individuals simultaneously move along at least two cultural continua (or dimensions) influencing how individuals learn and/or modify certain aspects of the new culture and their culture of origin" (Marín & Gamba 1996. p 297).

Regardless of how acculturation is conceptualized, it has been shown to be a significant predictor of diet trends (Neuhouser, Thompson, Coronado & Solomon, 2004). A key consideration in eating patterns among Hispanics is that women have traditionally had a strong influence on their family's nutrition habits; making Hispanic women's acculturation a factor in their decision making process regarding nutrition habits (Arredondo, Elder, Ayala, Slymen & Campbell, 2006). The problematic for public health and health education researchers and professionals is the limited information available on how acculturation has been used in health-related research with Hispanic women living in the USA, thus making decisions on intervention challenging.

Although research on health and acculturation is still emerging, there is some evidence indicating that the quality of the Hispanic/ Latino diet deteriorates during the acculturation process (Ayala, et al, 2008). There is additional evidence indicating that immigrant status and preservation of native cultural patterns protect against negative health outcomes. After living for some time in the US, this protection fades (Vega &

Amaro, 1994; Kaplan, Huget, Newsom & McFarland, 2004) as future generations are impacted by prevalence rates similar or higher to those of the US population (Singh & Siahpush, 2002).

The use of acculturation as a study variable in health-related research has potential to lead to more effective public health interventions. Although research has increased during the last decade (Atehortua & McKyer, 2009a; 2009b); it remains unclear how acculturation in health-related research can be translated to impact public health. Perhaps the key problem is a lack of standardization. At this time, there is not a single fully validated measure of acculturation, and significant variation exists on the conceptualization, definition, and operationalization of acculturation constructs.

Lack of consistent conceptualization and operationalization negatively impacts interpretation, generalizability, and applicability of results of existing research. Clearly, identifying standardized acculturation assessment scales needs to be critically examined (Arcia et al., 2001; Atehortua & McKyer, 2009a; 2009b).

Problem

The prevalence of obesity has increased substantially over the past few decades, especially among low-income Hispanic women in Texas; a large and growing ethnic group. Hispanic women also represent the majority of enrollment in the Texas WIC program. To more effectively devise and implement WIC programs directed toward Hispanic families, there needs to be more study on cultural and SES factors that modify positive nutritional behaviors and positive patterns of food consumption of Hispanic women.

Purpose of the Study

The purpose of this study was to determine the role of acculturation in the food consumption patterns of low income Hispanic women living in Texas. A theoretical framework consisting of acculturation, socio-demographic characteristics, and nutritional behaviors associated with the consumption of food products guided the study. Data from participants in the WIC program were utilized because their low-income status is verified via the WIC eligibility and qualification process. Outcomes of the study were used to inform future research and current practices.

Significance of the Study

Little is known about the relationship between food consumption behaviors and the process of acculturation among the largest growing ethnic group in Texas. To more effectively develop interventions reaching out to this important ethnic group, the field needs more insight into acculturation and its role in the obesity epidemic. This study sought to better understand the role of acculturation in obesity for this understudied group. Toward this end, data from the Texas Food & Nutrition (TEXFAN) was analyzed.

Since obesity is a strong risk-factor in the development of a host of chronic diseases, it is important to identify factors that impact food consumption behaviors and patterns of high risk ethnic groups such as Hispanic women. More research in this area will help to shape more effective interventions, programs and policies.

Research Question

This study sought to answer the following research question: How is acculturation associated with nutritional behaviors among low income Hispanic women living in Texas?

Hypotheses

a) H_1: Higher levels of acculturation are associated with unhealthy food consumption patterns among low-income Hispanic women enrolled in the Texas WIC program;

b) H_2: Socio-economic and demographic characteristics are associated with significant variations in food consumption among low-income Hispanic women enrolled in the Texas WIC program on the following measures:

- Age of respondents
- Level of education
- Level of employment
- Ethnic subgroup
- Area of residence

Respective null hypotheses are:

a) H_{01}: There will be no association between levels of acculturation and food consumption pattern (healthy or unhealthy), among low-income Hispanic women enrolled in the Texas WIC program.

b) H_{02}: There will be no differences in the consumption of fruit and vegetables among low-income Hispanic women enrolled in the Texas WIC program by the following measures;

- H_{O2i} age of respondents
- H_{O2ii} level of education
- H_{O2iii} employment status
- H_{O2iv} ethnic subgroup of respondents
- H_{O2v} residence of respondents

Research Aims

This study had the following aims:

a) To examine, via secondary data analysis, food consumption patterns among low income Hispanic women enrolled in the Texas WIC program and,

b) To examine, via secondary data analysis, the associations among acculturation and other personal and socio-demographic characteristics with food consumption patterns among low income Hispanic women enrolled in the Texas WIC program.

Financial Support

Funding for this project was made possible by grant support from the Texas Department of State Health Services Project # 2009-029937. Project Title: Design, Implementation, Feasibility, and Impact of a Nutrition Education Intervention Centered on the Revised WIC Food Packages, Peter S. Murano (PI); E. Lisako J. McKyer (Co-PI).

CHAPTER II

LITERATURE REVIEW

Acculturation has different specific definitions, but the concept incorporates perspectives of culture with two main interacting components; the host or mainstream culture, and the culture of origin (Berry, 1997; Burnam et al., 1987). In the mid 1970's examination of acculturation centered on the process by which people of a given culture adopted values and beliefs of a new culture (Teske & Nelson, 1974). Changes over the past two decades have shifted the focus to where acculturation was defined as the adjustments in values and behaviors made by individuals in one culture as the result of contact with another one (Burnam et al., 1987). Most recently the focus has slightly shifted to center on the reaction of those in the minority against those in the majority (Rudmin, 2003).

Theoretical models proposed for acculturation generally vary on how many dimensions are incorporated. One main dimension has been identified as the acceptance of the host culture, while a second common dimension is the maintenance of the original culture. A third dimension has also been identified and centers on interactions with the environment (primarily social relationships) with other groups. Some theoretical constructs have also included the rejection of both host and original cultures (Berry, 1997; Berry, 2003; Rudmin, 2003).

Given the variety of constructs involved in the definition, acculturation may be modeled conceptually as unidimensional, bi-dimensional, or multidimensional. Single-

dimension approaches incorporate one continuum as the primary form of analysis (Cuéllar et al., 1980; Chiriboga, 2004; Ayala et al., 2008); and bipolar models have also been used frequently (Ryder et al., 2000; Nguyen & von Eye, 2002; Cabassa, 2003). When the definition of acculturation simultaneously considers the interaction of both cultures (host and origin), without necessarily surrendering one for the other, then it is a bi-dimensional model; also known as bidimensional models of acculturation (Berry et al., 1987; Beauvais, 1991; Birman, 1994; Cuellar et al., 1995; Oetting & Beauvais 1991; Marin & Gamba, 1996; Ryder et al.., 2000; Birman et al., 2002). Finally, when acculturation is theoretically modeled after the interaction of multiple constructs, this is considered as a multidimensional model (Johnston, 1963; Gordon, 1964; Olmedo & Padilla, 1978; Berry, 1980; Cuellar, et al, 1980; Marin et al, 1987; Birman, 1994; Laroche, Chankou, Huis & Tomiuk, 1997; Lara et al, 2005).

Conceptualization, operationalization and measurement of acculturation challenge researchers to logically connect the model of choice for the particular research process. Unidimensional models are usually represented by a simple score; bidimensional models are represented by categories; and multidimensional models have different ways of measurement and expression (Nguyen & Benet-Martinez, 2007; Cabassa, 2003). Unidimensional or bipolar measures have been extensively used in research among Hispanics/Latinos based on the assumption that adoption of the new culture displaces the culture of origin (Zane & Mak, 2003; Dana, 2000; Marin, 1993).

On the other hand, bidimensional measures expand the conception that cultures do not cancel each other out, but on the contrary, reinforce the conception that the level

of identification with one culture is independent of the level of identification with another one (Cabassa, 2003; Zane & Mak, 2003; Marin & Gamba,1996; Dana, 2000). Bidimensional measures have progressively become more popular and examples of scales that have been extensively used for research in acculturation among Hispanics/Latinos are combinations of proxy measures such as generation level, place of birth, years in the U.S., language preference, language use, and language proficiency to measure levels of acculturation of research subjects (Birman, et al., 2002; Birman, 1994; Zambrana, Silva-Palacios & Powell, 1992; Berry et al, 1987) the Bidimensional Acculturation Scale for Hispanics (BAS) (Marin & Gamba, 1996), the Acculturation Rating Scale for Mexican Americans – ARSMA (Cuellar et al., 1980); the revised Acculturation Rating Scale for Mexican Americans-II, ARSMA II (Cuellar et al., 1995), the Short Acculturation Scale (Marin & Marin, 1991); and the Multidimensional Acculturation Scale II (MAS-II) (Rodriguez, Mira, Paez & Myers, 2007) or adaptations like the ARSMA-II used to measure acculturation to the Canadian culture by Chinese-Canadians (Costigan & Su, 2004). Also, bidimensional scales have been used to develop research in acculturation among other ethnic groups, i.e.: the Suinn-Lew Asian Self-Identity Acculturation Scale (SL-ASIA) (Suinn, Ahuna, & Khoo, 1992; Dao et al., 2011).

Although acculturation research has continued to move forward in social science research, the public health field has only recently begun to identify its research potential in examining the role of acculturation and health outcomes of immigrant groups. A well-established phenomenon has recognized that as immigrant groups settle in a country, the

following generations of children tend to experience health outcomes very similar to the health outcomes of the host country. Given this phenomenon, the process of acculturation somehow impacts the health status of many Hispanic groups in America. Acculturation has been shown to be a strong predictor of health outcomes in Latino populations (Harley & Eskenazi, 2006).

A confounding factor is that many immigrant groups initially have lower socioeconomic status (SES), this also puts them at risk of health problems (Derose, Escarce & Lurie, 2007). Subsequently, understanding factors that impact immigrant groups and other groups with disparities in health outcomes is a key concern in managing the country's health care industry as identified by the Institute of Medicine's report on inequalities in health care (Institute of Medicine, 2007). Therefore, acculturation research with Hispanic groups has potential for eventually modifying health risks and health care practice.

Concerns in public health primarily focus on population based approaches to modify group risk factors and improve the health of groups with common characteristics. A challenge to public health is the growing population of Hispanics (especially lower SES) in the United States. Given the rapid growth of this subgroup, a critical need exists to improve what is known about acculturation in regards to health outcomes and Hispanic groups. Also, it was noted that the use of acculturation in health-related research has notably increased especially in the last decade (Atehortua & McKyer, 2009a; 2009b). In these exploratory studies, the authors identified that research including acculturation among Hispanics in general and among Mexican Americans in particular

had been consistently gaining track since the year 2000, especially within the five years previous to the reports. However, it remains unclear is how acculturation is used in health-related research among low-income Hispanic women.

In order to examine a Hispanic population and to provide a comprehensive framework for this study, a literature search was conducted focusing on published studies carried on between the decade comprised between January 2000 and December 2010. This review centered on the use of acculturation in research related to women and Hispanics (Atehortua & McKyer, 2009 a; 2009b). The methodological guideline for reviewing the articles and systematizing the analysis used the Matrix method (Garrard, 2007). Articles were evaluated and ranked using a non-validated Methodological Quality Score (MQS) scale.

The following keywords and Medical Subject Headings (MeSH) (PubMed/MEDLINE) were used: Acculturation, Hispanic, Mexican-American, Latina, Women, Health, and United States. Major indexed databases included in the search were: a) PubMed (Medline) – EBSCO and OVID, b) Web of Science, c) EBSCOHost - Academic Search Complete and CINAHL, d) PsycINFO – CSA, e) ERIC - EBSCO and OVID, f) SCOPUS; g) ProQuest – CSA; h) Social Sciences Full Text – CSA, and i) Google Scholar & purling articles from of major health behavior/education journals using the Texas A&M University Library's website.

Articles for this review were included if they satisfied the following criteria: a) Published in leading indexed, peer-reviewed journals relevant to health education and health promotion fields, b) published nationally in the English Language between

January 1st, 2000 and December 31st, 2010, c) the study was developed in the US, d) the research or intervention reports in which health outcomes and health-related behaviors were among the variables studied; and e) qualitative, quantitative or mixed methods reports with at least two measures (one of them stated as acculturation or one of its proxy measurements).

Exclusionary criteria for this review were set as: a) Journals neither indexed nor peer-reviewed, b) reports of other reviews of the literature, c) literature from unpublished sources such as conference presentations or dissertations; and d) other scholastic papers not satisfying inclusionary criteria.

Another key decision-making consideration was the quality of the published work. Published work that did not operationalize the use of theory (did not specify how theory led the research process) or work that did not clearly define constructs and their development, was not included. Indeed, lack of rigor in the use of theory-guided research (lack of definition, inconsistency, and decontextualized application) has been common and has encouraged some researchers to question whether or not acculturation in health-related research is sufficiently mature upon which to make health-related decisions relevant to interventions and policies (Hunt, Schneider & Comer, 2004).

More recently, the area of scholarship on acculturation has shown signs of maturing (Arends-Toth & Van de Vijver, 2006), with greater emphasis on acculturation and communities (Ward & Kagitcibasi, 2010). Emerging evidence has demonstrated that biculturalism is a protective asset against risky behaviors or mental health problems (Bacallao & Smokovsky, 2005). Research efforts on the value of acculturation continue

to develop in the areas of business and communication (Lerman, Maldonado & Luna, 2009; Berkowitz, Bao, & Allaway, 2005). This work has helped to promote standardization in the study of acculturation, and in turn can be used to assist research in the field of public health.

Methodological Criteria Used for the Literature Review

Details about the criteria used to evaluate the utilization of theoretical models of acculturation and to make an assessment on quality of the research papers are presented in tables in this section. Table 2 presents the criteria used for assessing the use of theoretical frameworks. In its application to review published studies, scores were utilized ranging from three points (a clear and complete utilization of a model of acculturation) to zero points (the complete lack of evidence of theory utilization).

Table 2. Criteria for evaluation of utilization of acculturation theoretical models.

Criteria	Score
Clear and complete utilization of a theoretical model of acculturation	3
Provide a definition of acculturation with some theoretical context	2
Provide a definition of acculturation	1
No mention and/or no evidence of utilization of a theoretical model	0

Table 3 displays the conceptualization and operationalization of acculturation assessment criteria. In the review of a published study, both factors are scored on zero to three point scales with zero representing a lack of evidence to an excellent score represented by a score of three. The final rating examined the quality of the studies. Each

was evaluated on what model(s) of acculturation was/were utilized, along with an analysis of their conceptualization and operationalization.

Table 3. Criteria for evaluation of conceptualization and operationalization of acculturation as a measure.

Criteria	Score
Conceptualization of acculturation	
Conceptualization is complete including a whole model	3
Conceptualization is presented with some context	2
Some degree of conceptualization	1
No conceptualization	0
Operationalization of acculturation	
Definition of how well it is measured (including validity & reliability)	3
Definition of how it is measured	2
Definition of what is measured	1
No operationalization	0

Criteria for assessing methodological quality are shown in Table 4. In scoring methodological quality, scores ranged from four points (a well written and technically complete description of a study design, methods, instrumentation, clear statistical analysis including effect sizes estimates), to zero points (the study lacked fundamental information or showcased serious flaws).

Table 4. Criteria for methodological quality scores (MQS) of the literature reviewed on acculturation.

Criteria	Score
Study design, methods, instrumentation, and statistical report are well described and complete, no flaws.	4
Study design, methods, instrumentation, and statistical report are well described but lack report of effect sizes	3
Study design, methods, instrumentation are well described but statistical analysis is not complete/clear.	2
Study design and methods are well defined but statistical report is not	1
Study design, methods, instrumentation, measures, and statistical report is flawed and/or absent.	0

The review conducted to identify acceptable research studies was completed in four steps: a) description of the general characteristics of the literature, b) analysis of the utilization among research reports of models of acculturation, c) analysis of methods used among research reports; and, d) an assessment of the methodological quality of research reports including conceptualization and operationalization.

Selection of Research Articles

Figure 4 depicts a schematic overview of the literature search. Among the 345 articles initially identified, 205 met the inclusionary criteria. Preliminary analysis eliminated six articles not appropriate to the purpose of the study, resulting in the identification of 199 articles.

A second search with additional key words further identified 21new articles bringing the total number to 220 published studies. These 220 studies were examined using the review criteria resulting in 57 studies that met the necessary criteria. A detailed inventory of published studies included in this review can be found in Appendix B.

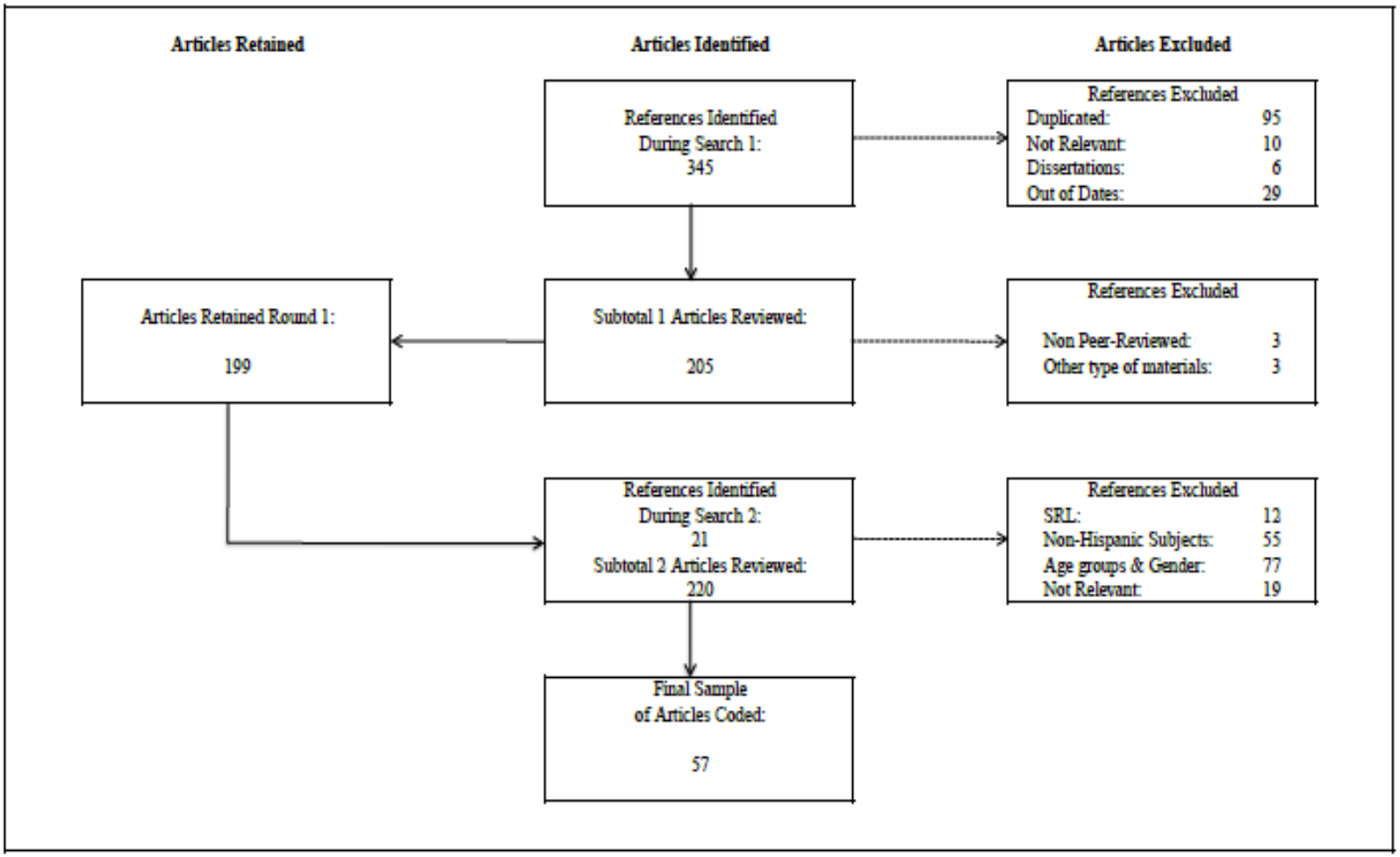


Figure 4. Results of selection process of research articles

Year of Publication

Articles were classified by year of publication to identify any trends in the data (Figure 5). The number of articles on acculturation in health-related research for single years gradually rose from three articles in 2000 to ten articles in years 2009 and 2010 respectively. Seventy percent (*N*=40) of the studies were published between the years of 2005 and 2010 with. Notably, 42.6%, (*N*=26) of acceptable studies were published between 2008 and 2010.

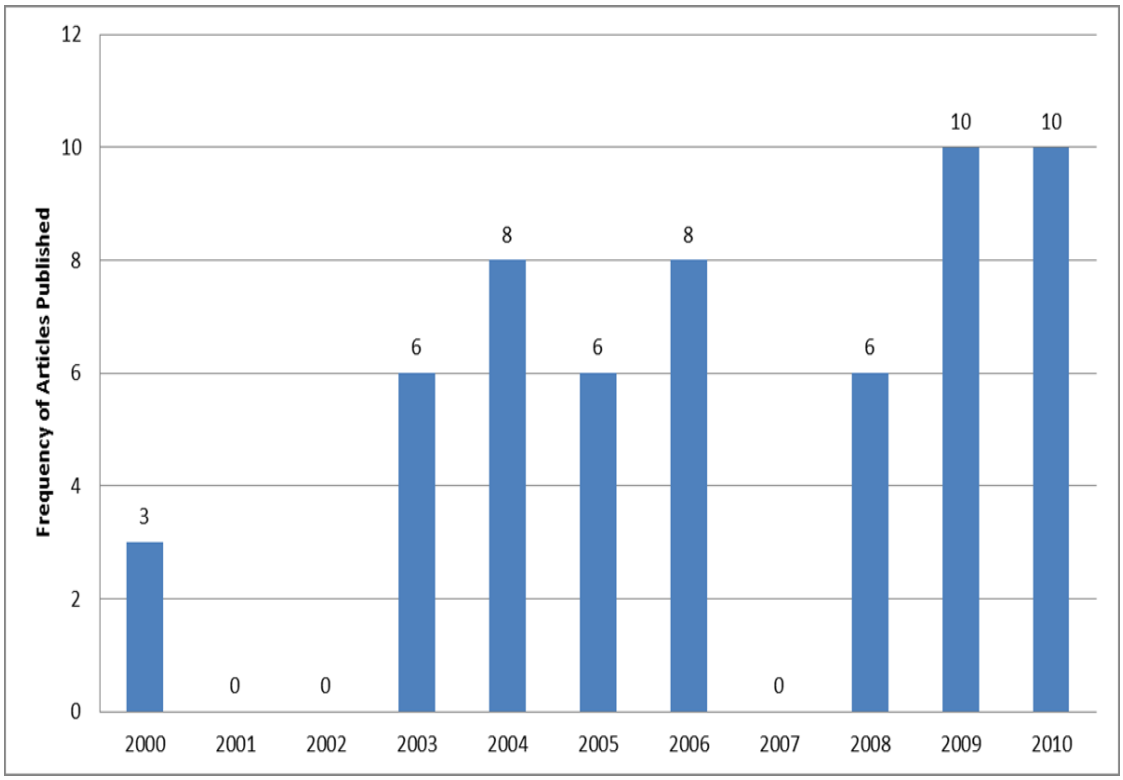


Figure 5. Year of publication of literature on acculturation in health-related research among Hispanic women in the United States

Utilization of Theoretical Models of Acculturation

Of the acceptable articles that met review criteria relatively few utilized well defined theoretical models of acculturation. About two-thirds (64.9%; *N*= 37) did not clearly define which model of acculturation was used. There were only ten studies (17.5%) that discussed which model of acculturation was used and how it was used (Table 5).

Table 5. Support of theoretical models of acculturation and health-related research among Hispanic women in the United States.

Theoretical Model or Framework	N	%
Articles using acculturation as a variable	24	42.1
Articles not supported by a theoretical model of acculturation	13	22.8
Articles well supported by a theoretical model of acculturation	10	17.5
Articles partially supported by a theoretical model of acculturation	10	17.5
Total	57	100

Abraido-Lanza used a multidimensional model approach to examine the effect of acculturation on breast cancer screening (Abraido-Lanza, Chao & Gates, 2005b). Initial analyses found that highly acculturated female Latinas were significantly more likely to perform breast self-exams and mammograms than low acculturated Hispanic females. No significant differences were found for simple comparisons on pap smears. Problematic in the analyses was that differences for mammogram disappeared after controlling for age, education, and income. However, differences remained for breast self-exam which left the influence of acculturation unconfirmed.

Abraido-Lanza's first study was followed with a second study on the influence of acculturation on smoking, alcohol, physical activity, and obesity among Hispanics. Results confirmed that more acculturated Latinos and Latinas were more likely to smoke, drink alcohol, to be at higher BMI statuses, and to exercise than low acculturated Hispanics (Abraido-Lanza, Chao & Flores, 2005a).

A multi-dimensional approach to study acculturation was also used to examine metabolic syndrome among low-income Mexican-American women (Espinoza de los Monteros, Gallo, Elder, & Talavera, 2008). Findings established that higher levels of acculturation were associated with higher consumption of fruits, vegetables, and fiber; increased levels of exercise and lower odds of reaching diagnostic criteria for metabolic syndrome. The researchers speculated that the possible influence of neighborhood acculturation was modified by the better availability of healthy food and recreational facilities.

The literature review also identified acceptable studies using bidimensional models. Of particular interest was Ayala's work examining correlates of body mass index and waist-to-hip ratio among Mexican-Americans (Ayala, Elder, Campbell, Slymen, Roy, et al., 2004). The authors found that low acculturation and longer periods of residence in the US were significantly associated with higher BMI and Waist-to-Hip Ratios; however, no significant associations were found between levels of acculturation and diet.

Bartholomew was a second noteworthy study that used a bidimensional model of acculturation. This study utilized a validated scale (Short Acculturation Scale - SAS) in a

quasi-experimental study about a nutritional and physical activity intervention (Bartholomew, Miller, Ciccolo, Atwood, & Gottlieb, 2008). Findings in this study showed that a very simple intervention could successfully modify eating behaviors among WIC mothers. This study recommended nutrition counseling to promote an increase in consumption of fruits and vegetables.

Research Methodologies and Study Designs

Most research on acculturation has employed a quantitative approach (Table 6). More than 90% (93%, *N*=53) of the acceptable literature used a quantitative approach. The remaining seven percent consisted of qualitative (5.3%, *N*=3) and mixed methods (1.7%, *N*=1). Focus group interviews were the most popular qualitative approach. Bender and Castro (Bender & Castro, 2000) examined mothers' perceptions of resilience and risk associated with baby's birth weight using focus groups and photo narrative.

They found themes related to resilience and risk, five of the themes (access to health care, strong nuclear and extended family relationships, aspirations of a better life in the US, opportunity for a better education of children, and dreams of eventual return to Mexico) were considered protective for birth outcomes among immigrants and one theme (Unanticipated hardships and frustrations of life in the US) was consider a risk. The authors also considered that combination of focus groups and photo narrative helped them to elicit Hispanic women's perceptions.

Table 6. Type of research approach used on acculturation health-related research among Hispanic women in the United States.

Research Approach	N	%
Articles using quantitative approaches	53	93.00
Articles using a qualitative approaches	3	5.26
Articles using mixed methods approaches	1	1.74
Total	57	100

Structured interviews methodology was used for a study on perceptions of prenatal testing for birth defects on rural Latinas (Griffiths & Kuppermann, 2008). In this study, participants identified poor self-care practices like substance abuse, stress, poor diet as risky for birth defects. Respondents also identified beliefs such as the exposure eclipses or fatalism (fate or destiny associated with God's will) associating their occurrences with rewards or punishments. One third of respondents intuitively cited an underlying reason like inheritance or lack of self-care. Some negative feelings emerged like embarrassment, shame, or teasing if defects were evident to sight. Understanding of genetic testing results was low and misinterpretations of positive results were frequent, hence rising questions about the accuracy of tests among respondents.

The sole study that described the use of mixed methods examined beliefs about BRCA genetic counseling, and used focus groups (qualitative side) and telephone survey (quantitative side) with Latina participants in New York City (Sussner, Jandorf, Thompson, & Valdimarsdottil, 2010). From the survey, authors identified that respondents were aware about the existence of genetic testing and counseling but their

level of knowledge specifically on BRCA was rather low. From the focus groups, the authors confirmed findings about barriers to BRCA genetic counseling like lack of awareness, lack of knowledge, concerns of cancer risk among family members, religion and faith, and health insurance coverage; and some new like competing priorities and time to participate,. Latinas are at need of education interventions on BRCA testing and BRCA genetic counseling with materials appropriately adapted to their culture.

Study designs in the literature reviewed predominantly consisted of cross-sectional designs which accounted for about two thirds (64.9%, *N*=37) of the articles (Table 7). Secondary data analyses was the second most popular methodology (17.5%, *N*=10). Other singular designs in the literature included one Quasi-Experimental, and one Randomized-Controlled Trial. Singular studies also included mixed methods, longitudinal methods and a case-control approach.

Table 7. Study designs used in acculturation health-related research among Hispanic women in the United States.

Study Design	N	%
Cross-Sectional	37	64.91%
Secondary Data Analysis	10	17.54%
Qualitative	3	5.26%
Quasi-Experimental	2	3.51%
Randomized Control Trials	2	3.51%
Longitudinal	1	1.75%
Case - Controls	1	1.75%
Mixed	1	1.75%
Total	57	100

Measures of Acculturation

Acculturation is often measured unidimensionally using proxy variables, such as place of birth, years of residence in the US, and language use (Amaro & de la Torre, 2002). Measures that capture multiple dimensions of the construct have higher predictive utility than proxy indicators (Shah, Zhu, Wu & Potter, 2006).

When acculturation measures employ a multiple dimension approach the methodology allows for intragroup analyses (Norman, Castro, Albright, King, 2004). It has been demonstrated that individuals with similar backgrounds who have lived for the same time in the U.S., acculturate at different speeds and in different dimensions (Negy & Woods, 1992).

Table 8 shows the distribution of studies analyzed in the literature review partitioned by type of scale or proxy measured used. Twenty-four (40%) of acceptable articles used acculturation as a separate variable, and the majority of these studies used a validated scale for measurement (Table 9).

Table 8. Measurement of acculturation in health-related research among Hispanic women in the United States literature.

Main Author	Measure of Acculturation
Brown, 2003; Wilbur, 2003; Byrd, 2004; Norman, 2004; Leybas-Amedia, 2005; Shah, 2006; Graves, 2008; Griffiths, 2008; Venkat, 2008; Chen, 2009; Mack, 2009; Watts, 2009	Language Use
Bakhireva (2009)	Place of Birth
Fitzgibbon, 2003; Martinez-Schallmoser, 2003; Ayala, 2004; Borrayo, 2004; Kuo, 2004; Garcia, 2005; Kasyrie, 2005; Rojas-Guyler, 2005; Arredondo, 2006; Cachelin, 2006; Elder, 2006; Lopez, 2006; Espinoza de los Monteros, 2008; Fitzgerald, 2008; Lagos, 2008; Bothwell, 2009; Fernandez, 2009; Sussner, 2009; Wingo, 2009; Ceballos, 2010; Dixon, 2010; Jurkovsky, 2010; Kepka, 2010; Sussner, 2010	Validated Scales
Boeckner, 2000; Heilemann, 2000; Evenson, 2003; Evenson, 2004; Heilemann, 2004; Hessol, 2004; Abraido-Lanza, 2005b; Heilemann, 2005; Harley, 2006; Davila, 2009; Wolin, 2009; Haskins, 2010; Kobetz, 2010; Sanchez, 2010; Vadaparampil, 2010	Combination of Proxies
Bender, 2000; Voorhes, 2003; Boeckner, 2006; Garces, 2006; Lora, 2010	No proxy or scale use reported

Table 9. Scales and proxies used to measure acculturation in health-related research among Hispanic women in the United States.

Measurement of Acculturation	N	%
Articles using a validated scale to assess acculturation	24	42.11
Articles using a combination of measures of acculturation	15	26.32
Articles using language use as proxy for acculturation	12	21.05
No proxy or scale used	5	8.77
Articles using place of birth as proxy for acculturation	1	1.75
Total	57	100

Popular scales included: a) the Acculturation Rating Scale for Mexican Americans – ARSMA (Cuellar et al., 1980), ARSMA was developed to gauge the level of acculturation of Mexican Americans, ranging from very Anglicized to very Mexican passing by intermediate stages such as Anglo-oriented, bicultural, and Mexican-oriented. It has two subscales, the Anglo Orientation Subscale (AOS) with 13-items; and the Mexican Orientation Subscale (MOS) with 17-items; b) because of the criticism generated by the rigid unidimensional nature of the ARSMA scale, the scale was revised originating a new version of ARSMA or ARSMA II (Cuellar et al., 1995) allowing the bidimensional independent measurement of Anglo (AOS) and Mexican orientations (MOS).

Original behavioral items were preserved and new items associated with ethnic identity were added. This scale was valid, internally reliable, and consistent becoming very popular among social researchers to measure acculturation but its length (30 items) demanded the design of shorter instruments without losing construct measurability like c) the Short Acculturation Scale (Marin & Marin, 1991).

This short scale consisting of 12 items generating an acculturation index based respondents' language use, media, and ethnic social relationships. This abbreviated scaled yielded similar explanatory power of variance among Hispanics (not only for Mexican Americans) for acculturation when compared to ARSMA and ARSMA II and well associated with validating criteria like generational status, time of residence in the US, and age at the moment of arriving to the US. Acculturation was also measured using proxies alone or in combination.

A combination of proxies was the most common among proxy methods (26.3%, *N*=15). Among proxies using singular measures the most frequently used was language use (21.0%, *N*=12). Five of the research reports did not confirm their method of measurement of acculturation.

Statistical Techniques Used

A wide range of statistical tools were employed by researchers to examine acculturation (Table 10). A form of logistic regression was the principal choice. Indeed, alone or combined, logistic regression techniques were used in almost half (45.6%, *N*=26) of the articles reviewed. Chi-square, t-tests, ANOVA (and similar) techniques were less frequently employed (22.8%, *N*=13).

Table 10. Statistical technique used in acculturation in health-related research among Hispanic women in the United States.

Statistical Technique	N	Percent
Multivariate Logistic Regression (MLR)	11	19.3%
Univariate Logistic Regression (ULR)	10	17.5%
X2 and t-test	7	12.3%
ANOVA - MANOVA -ANCOVA - MANCOVA	6	10.5%
Combination ULR - MLR	5	8.8%
Combination of Techniques	5	8.8%
Descriptive Techniques and Qualitative Methods	5	8.8%
SEM - DFA - Hierarchical Regression Analysis	4	7.0%
Exploratory and Confirmatory Factor Analysis	1	1.8%
Other Techniques Used Individually	3	5.3%
Total	57	100

Approximately one-third of the analyses employed more advanced techniques such as Structural Equation Modeling (SEM), Discriminant Function Analysis (DFA), Hierarchical Regression Analysis (HRA), Exploratory Factor Analysis (EFA), and Confirmatory Factor Analysis (CFA) (Table 11).

Table 11. Statistical techniques used in acculturation and health-related research among Hispanic women in the United States.

Main Author	Statistical Technique
Evenson, 2003; Vorhees, 2003; Wilbur, 2003; Evenson, 2004; Garcia, 2005; Shah, 2006; Davila, 2009; Watts, 2009; Wolin, 2009; Ceballos, 2010	Univariate Logistic Regression (ULR)
Brown, 2003; Byrd, 2004; Hessol, 2004; Kuo, 2004; Norman, 2004; Abraido-Lanza, 2005b; Arredondo, 2006; Fitzgerald, 2008; Bothwell, 2009; Jurkowsky, 2010; Kepka, 2010	Multivariate Logistic Regression (MLR)
Martinez-Schallmoser, 2003; Bakhireva, 2009; Mack, 2009; Sussner, 2009; Haskins, 2010	Combination ULR – MLR
Heilemann, 2000; Fitzgibbon, 2003; Heilemann, 2004; Heilemann, 2005; Rojas-Guyler, 2005; Lagos, 2008; Lora, 2010	χ^2 and t-test
Boeckner, 2000; Leybas-Amedia, 2005; Boeckner, 2006; Cachelin, 2006; Elder, 2006; Venkat; 2008	ANOVA - MANOVA - ANCOVA - MANCOVA
Borrayo, 2004; Lopez, 2006; Dixon, 2010; Sanchez, 2010	SEM - DFA - Hierarchical Regression Analysis
Bender, 2000; Garces, 2006; Griffiths, 2008; Sussner, 2010; Vadaparampil, 2010	Descriptive Techniques and Qualitative Methods
Ayala, 2004; Harley, 2006; Espinoza de los Monteros, 2008; Graves, 2008; Chen, 2009	Combination of Techniques
Fernandez, 2009	Exploratory and Confirmatory Factor Analysis
Kasirye, 2005; Wingo, 2009; Kobetz, 2010	Other Techniques Used Individually

Quality of Conceptualization and Operationalization

When all scoring criteria were considered on these criteria, the maximum possible score was 13. This would indicate a clear and complete report of use of theory, conceptualization and operationalization, along with a complete report (including measurement and effect sizes). Scoring criteria for quality assessment were applied to the 57 publications meeting the inclusionary criteria (Appendix C).

Qualitative studies were also utilized in the review. Approximately one-quarter of the research reports (26.3%, *N*=15) achieved 90% or more on the criteria for evaluating quality of the literature. A list of the articles showcasing this level can be found in Table 12.

Table 12. Highest ranking articles by quality on literature published on acculturation and health-related research among Hispanic women in the United States.

Main Author	Quality of Literature Reviewed
Martinez-Schallmoser, 2003; Ayala, 2004; Norman, 2004; Abraido-Lanza, 2005b; Kasirye, 2005; Harley, 2006; Sussner, 2009; Ceballos, 2010; Kepka, 2010	100.00%
Leybas-Amedia, 2005; Espinoza de los Monteros, 2008; Davila, 2009; Wingo, 2009; Wolin, 2009; Sussner, 2010	90% - 99%

A study that showed strong conceptual and operationalization characteristics was conducted by Ceballos and Palloni (Ceballos & Palloni, 2010). They compared the results of an existing survey on acculturation, socioeconomic factors, infant, maternal health and birth outcomes among Hispanic immigrants residing in the Midwest with data a sub-sample of Hispanic women on the same variables drawn from the 1995 National Survey of Family Growth Cycle V (NSFG V) conducted by the National Center for Health Statistics (NHS) on maternal and infant health in the United States. Comparisons supported the idea of the acculturation paradox, the more acculturated the individual the poorer the health status.

Espinoza de los Monteros (Espinoza de los Monteros, 2008) also examined low-income Mexican American women focusing on the association of neighborhood acculturation, nutrition behavioral factors, and metabolic syndrome components (Blood Pressure, Serum Triglycerides, and Plasma Glucose); they found an association between acculturation, consumption of fat, fruit and vegetables and levels of physical activity. Another study with strong characteristics examined awareness, perceptions, and provider recommendations related to genetic testing for hereditary breast cancer risk (BRCA) among at-risk Hispanic women (Vadarapampil, McIntyre & Quinn, 2010).

The authors found noteworthy sub-ethnic differences that included preferences for physician recommendations and information about genetic testing. This study provided insights highlighting the need to consider sub-ethnic groups in the Hispanic community when planning educational interventions.

Health Outcomes Research among Hispanics

Table 13 illustrates health outcomes research with low-income Hispanic women living in the United States. Cancer (including Cancer Genetic Testing) was the most frequent area of research (26.3%, *N*=15), followed by Nutrition Practices and Obesity (19.3%, *N*=11); and by Maternal and Perinatal Health (17.5%, *N*=10). Additional research focused on Mental Health, Physical Activity, Sexual and Reproductive Health (including HIV/AIDS), and Health Disparities.

Table 13. Health outcomes on acculturation health-related research among Hispanic women in the United States.

Health Outcome	N	%
Breast and Cervical Cancer	13	22.81%
Nutrition Practices and Obesity	11	19.30%
Maternal and Perinatal Health	10	17.54%
Mental Health	7	12.28%
Physical Activity	6	10.53%
HIV/AIDS	3	5.26%
Health Disparities	3	5.26%
Cancer Genetic Testing	2	3.51%
Sexual and Reproductive Health	2	3.51%
Total	57	100

When it came to the study of obesity among low-income Hispanic women there were relatively few studies that met strong inclusion criteria. Arredondo (Arredondo, 2006) completed a cross-sectional study on the association of a traditional versus shared decision-making process meal preparation style with eating behaviors of Hispanic

women. Using a multivariate logistic regression technique a positive statistical association was found between Hispanic women's acculturation level and shared style for meal decision-making. Bigger barriers were identified for healthy consumption of fruits and vegetables among traditional decision-making households. They were more likely to eat saturated fats, less likely to consume products rich on fiber, and to reduce fat intake.

Wolin (Wolin, Colangelo, Chiu, & Gapstur, 2009) examined obesity and immigration among Latina women using years of life in the USA and preferred language as the dimensions for acculturation. The majority of respondents was foreign-born, and had low proficiency in English (relying predominantly on Spanish as their language for communication). Odds of obesity were twice as high among women living longer in the US (more than 20 years); however no significant relationship was found for language preference whatsoever.

Norman (Norman, Castro, Albright, & King, 2004) compared acculturation models examining nutrition habits among low-income Hispanic women. Nutrition habits were assessed by using validated scales from the National Cholesterol Education Program's Adult Treatment Guidelines. Four dimensions were used to capture acculturation status: Years lived in the in US (adjusted for age); preferred language use; place of birth; and a mixed variable consisting of place of birth and language use. Results showed that preference for speaking English at home was significantly associated with less consumption of beans and peas, and with greater consumption of convenience foods and salty snacks. Being born in the US was significantly associated

with greater consumption of convenience foods and candy. And, the study confirmed that how acculturation is operationalized does significantly influence whether acculturation is associated with dietary fat practices among low-income Hispanic women.

Fitzgerald (Fitzgerald, Damio, Segura-Perez & Perez-Escamilla, 2008) examined nutrition knowledge, food label use, and food intake patterns among Latinas. Nutrition knowledge scores were greater among those who had seen a registered dietitian or a diabetes educator. Furthermore this same group had more positive use of food labels, and indicated more healthful food intake patterns. Higher socioeconomic status (SES) was positively related to nutrition knowledge, intakes of fruits, vegetables, and meats. When acculturation was examined, it was positively related to soft drink and salty snack intakes.

Ayala (Ayala et al., 2004) developed a study associating measures of acculturation with respondent's body mass index (BMI) and waist-to-hip ratio (WHR). They found that bicultural Mexican American women were at a lower risk for high BMI and WHR and perceived fewer barriers for a healthier diet when compared to less acculturated women. They concluded that interventions aimed to prevent overweight/obesity status could be more effective if they promote traditional Mexican cultural practices while simultaneously teach women how to effectively integrate into the Anglo culture.

Summary of the Literature Review

Although the literature reviewed established that some studies showed strong theoretical characteristics, fewer than one in five could be classified as strong on a theoretical framework. The paucity of theoretical frameworks demonstrates the novelty of work in the field of acculturation.

To make positive strides in continued research, greater emphasis on theoretical factors will need to be adopted as an important consideration in the design of studies. This perspective has been voiced by some researchers who point to the lack of clear definitions or vagueness in the conceptualization of acculturation, and the excessive use of project-specific scales (Hunt et al., 2004; Ayala et al., 2008).

Much of this research has employed linear acculturation models, which falls short of explaining the complex and fluid nature of this construct (Arcia, et al., 2001). From a methodological perspective the field of acculturation research was weak. Only a fourth of the body of research provided a complete and specific description of the methodological approach (Atehortua & McKyer, 2009a; 2009b).

Another concern was the predominance of quantitative approaches based fundamentally on cross-sectional designs. Coupled with very limited qualitative research approaches the conclusions from existing research largely failed to provide any rich detail that could facilitate more complete development of intervention. This is further showcased since the utilization of complex statistical analytic tools that could provide more detailed insights were also weakly based in good scientific procedures.

At this time it is clear that acculturation research in the field of public health is in its initial phases of development. The next phase of work on this topic must incorporate better measures, better methodology, better analysis and better designs.

CHAPTER III

METHODS

Statement of the Problem

The prevalence of obesity has increased over time among low-income Hispanic women. Prevalence rates for obesity, and especially for extreme obesity, among Hispanic women in Texas are higher than rates females in general, as well as those for the State and the Nation. Hispanic women also represent the majority of women enrolled in the WIC program. Cultural and socio-economic factors are involved in the nutritional behaviors and patterns of food consumption of this population subgroup. This study examined the role of acculturation on the pattern of food consumption among low income Hispanic women living in Texas and enrolled in the WIC program. A theoretical frame consisting of acculturation, socio-demographic characteristics, and nutritional behaviors associated with the consumption of food products in the WIC package guided data collection, analyses, and interpretation of the results.

Research Question

This study sought to answer the following research question: How is acculturation associated with nutritional behaviors among low income Hispanic women living in Texas?

Hypotheses

a) H_1: Higher levels of acculturation are associated with unhealthy food consumption patterns among low-income Hispanic women enrolled in the Texas WIC program;

b) H_2: Socio-economic and demographic characteristics are associated with significant variations in food consumption among low-income Hispanic women enrolled in the Texas WIC program on the following measures:

- Age of respondents
- Level of education
- Level of employment
- Ethnic subgroup
- Area of residence

Respective null hypotheses are:

a) H_{01}: There will be no association between levels of acculturation and food consumption pattern (healthy or unhealthy), among low-income Hispanic women enrolled in the Texas WIC program.

b) H_{02}: There will be no differences in the consumption of fruit and vegetables among low-income Hispanic women enrolled in the Texas WIC program by the following measures;

- H_{O2i} age of respondents
- H_{O2ii} level of education
- H_{O2iii} employment status

- H_{O2iv} ethnic subgroup of respondents
- H_{O2v} residence of respondents

Research Aims

This study had the following aims:

a) To examine, via secondary data analysis, food consumption patterns among low income Hispanic women enrolled in the Texas WIC program and,

b) To examine, via secondary data analysis, the associations among acculturation and other personal and socio-demographic characteristics with food consumption patterns among low income Hispanic women enrolled in the Texas WIC program.

Research Design

A non-experimental research design with a secondary data analysis of the responses given to the Texas Food and Nutrition Questionnaire (TEXFAN-Q) was used to ascertain how acculturation is associated with nutritional behaviors among low income Hispanic women living in Texas and to test the study's hypotheses.

Participant Recruitment

Participants for the study were recruited from individuals presenting for nutrition classes or clinic services at all 73 WIC Local Agencies (LA) in Texas, during February 2009.

Instrumentation

The Texas Food and Nutrition Questionnaire (TEXFAN-Q) is a 122–item survey developed by the Institute for Obesity Research and Program Evaluation (IORPE),

Texas A&M AgriLife Research, and the Texas Department of State Health Services WIC Program. This questionnaire was designed to gather data regarding food preferences, general nutrition practices, measure consumption behaviors, and to assess the impact of new food packages among participants in the Texas WIC program. The TEXFAN-Q was developed and tested for validity and reliability. Details on the development and testing of the TEXFAN questionnaire have previously been reported (McKyer et al., 2010). The questionnaire is divided into four sections; items inquire about family nutrition (6 questions), adult nutrition preferences and behaviors (45 questions), infant nutrition issues (38 questions), and child dietary issues (33 questions). The subscales measures demographics, food preferences, and dietary habits of WIC participants and their offspring receiving WIC products. Participants are also asked to report their age in years, height in feet and inches, and weight in pounds.

Data Collection

For the overall larger study, as clients registered and waited for WIC services, the WIC agent invited them to complete the TEXFAN-Q. Clients were informed that this was voluntary and that their responses would not be linked to their personal information. Those who agreed, were given the questionnaire, asked to complete it as they waited for services, and return the completed form to the WIC agent when finished. A total of 6,884 individuals completed the TEXFAN-Q.

As the questionnaires were completed and prepared for data analysis, each one of them was issued a unique identification code called NCSHEAD or NCS Header that had no relationship whatsoever with the respondent's WIC FID Number or any other

personal identifying information. Subsequently, data were coded removing any identifiers and preserved the respondent's anonymity. The identity of participants cannot readily be determined by the investigator or anyone else because there is no way to link it with other personal information.

Inclusionary Criteria

For the present study, cases were selected if they met the inclusionary criteria. Because the focus of the present study focused on low income Hispanic women enrolled in the Texas WIC program, study participants were defined as Hispanic adult mothers enrolled in this program. A subset of data from the larger TEXFAN study Participants were excluded from the study if they were less than 18 years of age, not female, were currently pregnant, and/or not of Hispanic origin. Out of the 6,884 individuals who completed the TEXFAN_Q, 3,774 self-identified as being of Hispanic ethnic background, female and not currently pregnant. Another 438 women were excluded because they were less than 18 years of age. Subsequently, the final sample included 3,336 non-pregnant adult Hispanic women, 18 years of age and older.

Cleaning and Assessing Quality of Data

The raw data of the subsample for the present study were treated as follows: Responses were coded and entered into the Statistical Package for the Social Sciences (IBM-SPSS), PASW Statistics 18, release 18.0.1 for Windows (SPSS©, Chicago, IL). Data cleaning was completed in a two-step process. Initially, data were received and inspected for completeness. Data were then examined for errors in typing, inconsistent

coding or location of decimal points. Blank spaces were recoded to missing data (Mason, Gillenwater, Pugh, Kenefik, Collins, et al., 2000).

A total of 36 cases were identified as outliers using cross tabulation for height and weight. These cases either failed to reach the 5th percentile or exceeded the 95th percentile for height (in inches) and weight (in pounds) according to the CDC's anthropometric reference data for Mexican American women (McDowell, Fryar, Ogden & Flegal, 2008). These outliers were removed from analysis by using SPSS' case deletion option recoding values to missing data (Osborne, 2008; p.211; Mason et al, 2000). No inflation of likelihood of type I error was originated since it was only a small number of cases involved (Osborne, 2008). The following anthropometric reference data was used (McDowell et al., 2008):

Weight (in pounds) for Mexican American Females (+/- 2.0)

1. 5th Percentile 111.4
2. 95th Percentile 229.1

Height (in inches) for Mexican American Females (+/- 0.1)

1. 5th Percentile 58.0
2. 95th Percentile 66.2

Lower and upper limits were set for the study:

Weight (in pounds) for Hispanic Females

1. Lower limit 109.0
2. Upper limit 231.0

Height (in inches) for Hispanic Females

1.	Lower limit	58.0
2.	Upper limit	66.0

A duplicate copy of the original dataset was stored in an alternative hard disk drive. Copies of modified or adjusted datasets were kept in sequence on the researcher's personal computer. All transformations to the dataset were carefully registered. Quality check of the data was performed by verifying that cleaning processes had no effects on the distribution of the variables (pre and post cleaning review of variables).

Measures Used in the Study

Measures used in this study are presented and described in Appendix D. Selection of variables used in this study was based on previous research. In the case of gender (females) and race (Hispanic ethnic background of any skin tone), selection was based on the purpose of this study. Age has been associated with levels of acculturation (Yeh, Viladrich, Brunning, & Roye, 2009) and nutritional habits (Yeh, Ickes, Lowenstein, Schumal, & Ammermann, 2008). In addition, research has identified a continuum of problems associated with weight status as one transitions from adolescence to adulthood (Serdula, Ivery, Coates, Freedman, Williamson & Byers, 2003; Ogden et al., 2012a; Ogden et al, 2012b; Ogden et al., 2002).

Zip code

Zip code was used to reflect area of residence for a variety of reasons. First, zip code can identify locations on the extensive Texan border with Mexico (miles). Second, Texas has the second fastest growing Hispanic population and is the second most

populated State by Latinos in the US (US Census, 2006; p. 16-17). In addition, because residence close to the border has been associated with levels of acculturation (Siatkowsky, 2007) and food insecurity (Cunningham, Banker, Artiga, Tolbert, 2006; Haviland, Elliott, Hambarsoomian, Lurie, 2011) zip code could be used to examine area of residence effects. In the end, zip code was transformed into area of residence and coded as on the border with Mexico or not.

Educational attainment

Educational attainment (Vahratian, 2009; Shea, Stein, Basch, Freudenheim, Lantigua, et al., 1991) and other socio-economic factors, such as employment, especially among Hispanics, have been associated with being at risk for obesity. In addition, research had shown that they a have significant impact on the consumption of fruit and vegetables (Herman, Harrison, Afifi & Jenks, 2008). This is especially important when Hispanic females have higher unemployment rates than white non-Hispanic women (Maloney, 2010).

Food frequency and consumption pattern questions were selected from the TEXFAN questionnaire based on the CDC's Behavioral Risk Surveillance System (BRFSS) (CDC, 2009a) and the dietary recommendations of the five a day food pyramid. These items were used to classify food consumption as being healthy or unhealthy (Marcoe, et al., 2006; Britten, Marcoe, Yamini et al., 2006; USDA, 2005).

Variable transformations

Weight status

Body Mass Index (BMI) is an index of weight (pounds) for height (inches) and is a validated proxy measure of body fatness (WHO, 1995; WHO, 2000; CDC, 2011). BMI is widely used as a screening tool to gauge potential weight problems since values for BMI are age and gender independent among adults (WHO, 1995; WHO, 2000; CDC, 2011).

In this study, BMI scores were calculated based on the formula, BMI= ((Weight (lbs.) x 703)/ (Height (inches)) 2). BMI scores were transformed into the CDC's five standard weight status categories that are the same for all ages and for both adult men and women (CDC, 2011). For the purposes of this study and for the analysis of the data, respondents between 18 and 20 years of age were considered to be adults of 20 years of age.

The resultant variable, Weight Status, has five possible categories:

1.	Underweight:	BMI < 18.5
2.	Normal:	BMI between 18.5 and 24.9
3.	Overweight:	BMI between 25.0 and 29.9
4.	Obese:	BMI between 30.0 and 39.9
5.	Extremely Obese:	BMI at and ≥ 40.0

Acculturation

Acculturation in this study was conceptualized as a latent categorical independent variable created by recoding and adding the responses for the observed

variables Survey Language and Language Spoken at Home based on the Behavioral Risk Surveillance System (BRFSS) questionnaire for year 2006 (CDC, 2009a). Acculturation was classified into three categories: High Acculturation, Biculturalism, and Low Acculturation in order to discriminate by levels of acculturation (Oetting & Beauvais 1991; Marin & Gamba, 1996).

High acculturation was used to represent Hispanic women who responded to the questionnaire in English and reported using English as the preferred language at home. Biculturalism, or middle acculturation, corresponded to individuals who reported using any combination of different languages (English or Spanish) to answer the survey and preferred to use that language at home. Lastly, Low Acculturation was used to represent individuals who responded the questionnaire in Spanish and whose preferred language at home was also Spanish (Figure 6).

Language Used		Survey language	
		English	Spanish
At Home	English	High Acculturation	Bicultural
	Spanish	Bicultural	Low Acculturation

Figure 6. Categories for acculturation by use of language at home and language used to answer the TEXFAN questionnaire

Pattern of food consumption

The latent outcome variable, Pattern of Food Consumption (PCF), was based on the linear combination of responses to questions about food consumption in the TEXFAN questionnaire. Calculation of the PCF was adapted from the Healthy Eating Index (Blanck, Gillespie, Kimmons, Seymour, & Serdula, 2008; Guenther, Reedy, & Krebs-Smith, 2007; 2008a; 2008b; US DHHS, 2005).

Selected food consumption items were classified as healthy or unhealthy and based on the 2005 food pyramid classification of foods (Marcoe et al., 2006; Britten et al., 2006; USDA, 2005). Coded responses were transformed into scores that reflected positive (healthy servings of food items) or negative (unhealthy servings of food items) values with no consumption equaling a score of zero (0). The following equivalencies were used:

	Response	Unhealthy	Healthy
1.	Never or less than once per week	0.00	0.00
2.	1 to 3 times per week	- 0.25	+ 0.25
3.	4 to 6 times per week	- 0.50	+ 0.50
4.	1 time per day	- 1.00	+ 1.00
5.	2 times per day	- 2.00	+ 2.00
6.	3 times per day	- 3.00	+ 3.00
7.	4 or more times per day	- 4.00	+ 4.00

Scores for each respondent were summed and then converted into the dichotomous outcome variable Food Consumption Pattern. This variable included the following two categories:

1. Unhealthy Consumption Pattern: Sum of scores < 5.0
2. Healthy Consumption Pattern: Sum of scores ≥ 5.0

Data Analysis Plan Research Aim #1

Aim # 1 was to examine food consumption behaviors among low income Hispanic women in Texas. This aim was operationalized by assessing the food and drink consumption behaviors of low income Hispanic Women. Standard descriptive analyses including a) frequencies, b) central tendencies and measures of dispersion, and c) correlations were conducted for this review.

Missing data analysis

An exploratory analysis on missing data for weight by nutrition behavior variables was conducted to identify whether these data losses happened at random. In addition, this assessment was used to compare information available on nutrition behavior variables for missing and non-missing cases and to detect potential biases and plausibility of study results (Allison, 2000; Allison, 2001).

Data were filtered out using the missing case deletion default option of SPSS (listwise procedure) (SPSS, 2010) by recoding missing data to 9999 (Howell, 2007; Newman, 2003; Allison, 2000). This method was chosen because of its convenience and robustness for protection against substantial reduction of sample size and power (Howell, 2007; Cohen, Cohen, West & Aiken, 2003; Allison, 2001). Dummy coding, a

popular method among social science researchers for many years (Cohen, Cohen, West & Aiken, 1983), was discarded because of the generation of biased estimates (Allison, 2001) and the capacity of statistical software to generate robust analysis by using other approaches (Howell, 2007).

Cases with complete information for age, survey language, and language preferred at home were used to perform this analysis (Cohen et al., 1983; Cohen et al., 2003). Means and standard deviations were calculated followed by a comparison of mean consumption of fruit and vegetables in both subsets of missing data and non-missing data. Percentage of missing data was low and its elimination did not significantly affect sample size or power (Newman, 2003; Cohen, 1988).

Correlation analysis

Bivariate correlations among patterns of food consumption with demographic variables were calculated under the assumptions that a) cases where data were available would not differ systematically from cases where data were missing (Cohen et al., 2003) and b) the correlation matrices would be internally consistent (Howell, 2007; Newman, 2003; Allison, 2000).

Simple correlations between individual predictors (independent variables) with the criterion variable did not identify significant confounders and, therefore were not included as covariates in further analyses. Differences in squared correlations, (Thompson, 2008a; p. 108), between the two groups were also examined. The maximum absolute value difference among squared correlation coefficients was 0.09 which suggested that there was no redundancy of variables.

Data Analysis Plan Research Aim #2

The aim was to examine the associations of acculturation with food and beverage consumption patterns among low income Hispanic women, in response to the research question "Does acculturation affect food consumption patterns of low income Hispanic Women in Texas?" Variables studied include comparisons of age, educational attainment, employment, and other demographic characteristics.

Data analysis

In addition to standard descriptive analyses, the following analyses were conducted: a) One Way Analysis of Variance (ANOVA), b) t-tests, c) non-parametric tests; e.g., Kruskal-Wallis, Chi-square ($\chi 2$), and, d) regression analyses.

Descriptive statistics

Frequency counts, descriptive statistics using measures of central tendency (mean, median), measures of dispersion (standard deviation), and associations (correlations) were conducted. Analysis of missing data and residuals were performed in order to identify potential distortions or oddities (patterns) in the distributions of the variables.

Inferential analyses

Initially, Levene's tests of Homogeneity of Variances (Gastwirth, Gel & Miao, 2009) was used to determine if there were significant variations among group variances of consumption of fruit and vegetables by respondents' age groups, educational attainment, employment status, ethnic subgroups, and level of acculturation.

In the presence of homogeneity of variances, inferential analyses through a series of Analyses of Variance (ANOVAs) were used to identify significant differences between groups (Thompson, 2008a). When significant differences arose, Tukey's Honestly Significant Difference (HSD) post-hoc tests (Thompson, 2008a; p 328-329) were used to determine the location of significant differences between groups. This test was chosen in order to allow for all possible comparisons maintaining p-critical alpha level at acceptable levels (Jackson, 2008; p.247). When equality of variances were not assumed, non-parametric Kruskal-Wallis tests (Hollander & Wolfe, 1999; Noether, 1991), along with Mann-Whitney's U tests (Fay & Proschan, 2010; Armitage, Berry & Matthews, 2008; Lehman, 1975) were conducted to explore the significance of variations between and within groups. In the case of area of residence an independent samples t-test (Thompson, 2008a) was performed to identify significant differences on nutritional behaviors by residence in border and/or non-border areas.

The logistic regression Enter method (SPSS, 2010) was used to determine whether acculturation and nutrition behaviors could be used to predict pattern of food consumption while controlling for maternal demographic variables and individual conditions. Controlling for these variables served to statistically remove bias (Menard, 2002; Hosmer & Lemeshow, 2000).

Statistical significance of the model was analyzed through Goodness of fit by Hosmer and Lemeshow, Cox and Snell R^2; and Nagelkerke R^{2n} (Menard, 2002; Hosmer & Lemeshow, 2000). Appropriate effect sizes analyses were performed to identify whether a meaningful statistical difference was of any practical importance (Thompson,

2008b; Thompson, 2007). When necessary, Bonferroni corrections of p-critical values were computed by dividing the α level by the number of tests in the particular analysis, setting a new test-wise α level; this prevented the occurrence of type I error inflation (Hochberg, 1998).

CHAPTER IV

RESULTS

Descriptive Analysis

Study sample

A total of 3,336 WIC participants who took part in the TEXFAN survey in February 2009 met the criteria for inclusion in the study. All respondents consented before they completed the instrument. Records from non-pregnant women who self-identified as Hispanic of any ethnic origin and were at least 18 years of age were included in the analyses. The study was approved by the Texas A&M University's Institutional Review Board (IRB).

Missing data analysis

An exploratory analysis on missing data was conducted. Specifically, missing data for weight and nutrition behavior variables were examined to identify whether data losses happened at random or not. This analysis compared missing and non-missing cases and detected potential bias which may affect the results (Allison, 2000; Allison, 2001).

Responses (N= 3,336) were divided into 2 groups, a) cases with missing data for weight (N_m= 511); and b) cases without missing data (N_{nm}= 2,825) (Cohen & Cohen, 1983; Cohen & Cohen, 2003). Means and standard deviations were calculated followed by a comparison of mean consumption of fruit and vegetables in both subsets of missing and non-missing data.

Data were filtered using the default missing case deletion option of SPSS (listwise procedure) (SPSS, 2010) by recoding missing data to 9999 (Howell, 2007; Newman, 2003; Allison, 2000). This method was utilized because of its convenience and robustness. The missing case deletion procedure did not substantially reduce the sample size and power or increase of type II error (Howell, 2007; Cohen & Cohen, 2003; Allison, 2001). In addition, no discernible pattern of missing data was found (see Appendix E). Comparison of mean consumption of fruit and vegetables between missing and non-missing data for weight of respondents did not identify statistically significant differences between subsets for non-missing (t (3,260) = 0.331, p = 0.74), (M_{fvnmd} = 3.64, SD_{fvnmd} = 2.95) and for missing data respectively (M_{fvmd} = 3.59, SD_{fvmd} = 2.99). Percentage of cases with missing data on the outcome variable was low (N = 23; 4.5%) and its elimination did not significantly affect sample size or power (Newman, 2003; Cohen, 1988).

Correlation analysis

Bivariate correlations among patterns of food consumption with demographic variables were calculated under the assumptions that a) cases where data were available would not differ systematically from cases where data were missing (Cohen et al., 2003) and b) the correlation matrices would be internally consistent (Howell, 2007; Newman, 2003; Allison, 2000).

Results showed consistency in both subsets of data with strong statistically significant correlations and discernible patterns not revealed (Appendices F and G). For the missing data subset the following correlations were observed: Buy Fruits and

Vegetables with Prepare Meals r (483) = 0.598, $p < .0001$; Fruit and Vegetable Daily Consumption with Fruit r (488) = .819, $p < .0001$; Fruit and Vegetable Daily Consumption with Vegetables r (488) = .84, $p < .0001$; Fruit and Vegetable Daily Consumption with Other Vegetables r (488) = .753, $p < .0001$; Fruit and Vegetable Daily Consumption with Potatoes r (488) = .578, $p < .0001$; Vegetables with Other Vegetables r (489) = .0.553, $p < .0001$; and White Bread with White Flour Tortillas r(477) = .0.558, $p < .0001$.

Similar correlation coefficients were observed for the non-missing data subset. Buy Fruit and Vegetables with Prepare Meals r (2,779) = 0.585, $p < .0001$; Fruit and Vegetable Daily Consumption with Fruit r (2,801) = .806, $p < .0001$; Fruit and Vegetable Daily Consumption with Vegetables; r (2,803) = .857, $p < .0001$; Fruit and Vegetable Daily Consumption with Other Vegetables r (2,761) = .766, $p < .0001$; Fruit and Vegetable Daily Consumption with Potatoes r (2,802) = .607, $p < .0001$; Vegetables with Other Vegetables r (2,824) = .0.573, $p < .0001$; and White Bread with White Flour Tortillas r (2,774) = .0.635, $p < .0001$ with the addition of the correlation between Potatoes with French Fries r (2,740) = .507, $p < .0001$.

Simple correlations between individual predictors (independent variables) with the criterion variable did not identify significant confounders and, therefore, were not included as covariates in further analyses. Differences in squared correlations (Thompson, 2008; p. 108) between the two groups were also examined (Appendix H). The maximum absolute value difference among squared correlation coefficients was 0.09 suggesting that the variables were not redundant.

Demographics

Demographic characteristics of the study participants are presented in Appendix I. Participants ranged in age from 18 to75 years (*M*=27.8, *SD* = 7.1 years). The majority of respondents were white Hispanics (87.6%, *N*= 2,923), high school graduates (70.6%, *N*= 2,267), unemployed (67.5%, *N*= 2,237), and residing in non-border areas (71.2%, *N*= 2,140) of Texas.

Acculturation

Information on levels of acculturation are found in Appendix J. Results indicated that more than half of the respondents (66.4%, *N*=2,218) had a high or intermediate level of acculturation and a small portion of the respondents (33.5%, *N*=1,289) had a low level of acculturation. More than half of the WIC participants completed the English version of the survey (57.2%, *N*= 1,907) and more than 25 percent (27.6%, *N*= 921) reported that they spoke English at home.

Weight status

As described in the methods section, outliers for weight status were identified and deleted from the dataset in order to perform analysis on the remaining subjects. On average, respondents were close to 63 inches tall (*M*=62.76, *SD*=3.0 inches) and weighed about 150 pounds (*M*=157.65, *SD*=29.1 pounds). Body Mass Index (BMI) using height and weight was calculated for each woman (*M*=28.4, *SD*=5.3). More than two thirds of the women (70.0%, *N*= 1,709) had a weight status as reflected by the BMI that was higher than normal (Appendix K). More than a third were classified as overweight (32.8%, *N*= 800); 25.2% were classified as obese (*N*= 616); and 12.0% were

classified as extremely obese (*N*= 293). About a quarter of the respondents (29.7%, *N*= 724) were at a normal weight and only seven respondents (0.3%) were underweight.

Nutrition behaviors

Women responded to questions on daily fruit and vegetable consumption. On average, respondents consumed about two-thirds of the daily recommended servings of fruits and vegetables (*M*=3.63, *SD*=2.95) (Appendix L). Nearly three quarters of the respondents (72.3%, *N*= 2,358) did not consume the recommended five servings of fruits and vegetables daily. A small proportion of respondents (0.6%, *N*= 21) consumed no fruits or vegetables at all on a daily basis. About a quarter of respondents (27.7%, *N*= 904) consumed the recommended 5 servings a day of fruits and vegetables.

Further analysis of the aggregated consumption of fruit and vegetables revealed that respondents ate on average 1.13 servings a day (*SD*=1.10) of vegetables. About one tenth (7.0%, *N*=233) reported that they did not eat vegetables at all; and a little more than forty percent (43.5%, *N*=1,451) ingested less than one serving a day. For potatoes respondents reported consuming an average of about one half of a serving a day (*M*=0.46, *SD*=0.64). About one fifth (20.3%, *N*= 677) of the women did not consume potatoes, and an additional 62.8% (*N*= 2,095) did not consume even one serving a day.

The average consumption of other vegetables (not including carrots, potatoes, or salad) did not reach a serving a day not without some variability (*M*=0.69, *SD*=0.87). More than fifteen percent (15.4%, *N*=514) did not consume vegetables at all and more than half of the respondents (55.2%, *N*=1,803) did not consume one serving a day. Less than one third (28.5%, *N*=949) of the respondents consumed at least one serving a day.

The average consumption of French fries was below one half of a serving (*M*=0.42, *SD*=0.64). About a third of the respondents (29.9%, *N*=962) did not eat fries at all, while more than half (53.1%, *N*= 1,709) ate less than one serving a day. Adding the average consumption of vegetables, potatoes and other vegetables not included in the main category, indicated that the minimum recommended amount of three servings of vegetables a day was not reached.

For fruit, the mean consumption was slightly more than one serving a day (*M*=1.33, *SD*= 1.19). About one tenth of the respondents (7.6%, *N*=254) did not eat any fruit while another third (36.3%; *N*=1,211) consumed less than one serving a day. Average fruit juice consumption was similar to that for fruit with a little more than one serving a day (*M*=1.27, *SD*=1.17). A small portion of the respondents (7.3%; *N*=243) did not consume fruit juice and another third (38.2%, *N*=1,275) consumed less than one serving a day. Taking into consideration both the average consumption of fruit and fruit juice (2.6 servings / day), consumption of fruit components was slightly more than the minimum recommendation of two servings of fruit a day. Nonetheless, the overall consumption of vegetables and fruits (4.06 servings / day) did not reach the target of 5 servings a day.

Sweetened beverages were also examined; this included both artificially sweetened as well as sugar sweetened beverages. Results showed that women consumed about one half of a serving a day (*M*=0.55, *SD*=0.85) of artificially sweetened beverages. Close to half of the women did not consume any artificially sweetened beverages (42.1%, *N*= 1,405). Sugar sweetened beverages were more popular among respondents.

Although one third of the women (35.1%, *N*= 1,171) consumed at least one serving a day, quite a few (24.4.0%, *N*= 814) abstained. Overalls, respondents consumed close to one serving of sugar sweetened beverages a day (*M*=0.84, *SD*=1.08).

Bread was not a popular food item among WIC participants. Consumption of whole grain bread (*M*=0.67, *SD*=0.85) was slightly higher than the consumption of white bread (*M*=0.52, *SD*=0.77). Half of the women (50.1%; *N*= 1,646) reported eating less than one serving of white bread a week, while 28.9% did not consume white bread at all. Approximately 48% (*N*=1,562) reported eating less than one serving of whole grain bread a week while 21.6% (*N*=707) did not eat whole grain bread.

Daily consumption of tortillas varied by type: corn, flour or wheat. Respondents reported consuming corn tortillas most frequently (*M*=1.01, *SD*=1.08); the average consumption of corn tortillas was twice that for white flour tortillas (*M*=0.47, *SD*=0.74) and was about three times higher than the consumption of whole wheat tortillas (*M*=0.28, *SD*=0.63). Only 13.2% (*N*= 434) reported that they did not consume corn tortillas, while more than forty percent (42.4%, *N*= 1,364) had at least one serving a day. Most respondents (64.0%, *N*= 2,065) did not eat whole wheat tortillas.

Most respondents ate rice. The mean consumption of white rice (*M*=0.42, *SD*=0.62) was almost double the amount for brown rice consumed (*M*=0.23, *SD*=0.52). Many respondents reported that they did not eat brown rice (62.1%, *N*= 2,021). Oatmeal was not a common food source for WIC participants (*M*=0.40, *SD*=0.61). More than one third (36.5%, *N*=1,202) did not eat oatmeal during the week and about half (45.2%, *N*= 1,484) reported having less than one serving a day.

Respondents reported their preferences for fruits and vegetables and which they preferred to buy. Most reported that they preferred to often or always buy fruits and vegetables (81.6%, *N*= 2,724). More than 80 percent (82.3%, *N*= 2,644) preferred purchasing fresh vegetables while 94.7% (*N*= 3,046) preferred fresh fruits. Many respondents reported that they preferred to often or always prepare meals with fruits and vegetables (68.5%, *N*= 2,286).

Examination of patterns of food consumption revealed that almost three-fourths (71.6%, *N*= 2,358) of the women had a non-healthy diet in terms of fruit and vegetable consumption (Appendix M). When consumption of fruit juice was not included (Appendix N) the proportion of respondents consuming a non-healthy diet increased to more than 80% (83.0%, *N*= 2,709).

Inferential Analysis

Consumption of food by age groups

Food and beverage consumption patterns among respondents were further examined based on age of the respondent. Age was divided into 8 categories: 18 to 20; 21 to 25; 26 to 30; 31 to 35; 36 to 40; 41 to 45; 46 to 50; and more than 50 years of age. Levene tests were initially performed on the DVs to check for homogeneity of variances (Gastwirth, et al., 2009). As shown in Table 14, equality of variances was assumed for fruit and vegetables daily average consumption ($F(7; 3,254) = 1.479$, $p=0.17$), artificially sweetened beverages ($F(7; 3,328) = 1.87$, $p=0.07$), and for oatmeal ($F(7; 3,281) = 0.99$, $p=0.43$); for all other variables, the Levene's test identified significant differences, therefore, inequality of variances was assumed.

Table 14. Test of homogeneity of variances of daily average of fruit and vegetables consumption by age group.

Daily Average Servings	Levene's Statistic	df1	df2	Sig.
Fruits & Vegetables Daily Consumption	1.479	7	3,254	0.17
Fruit Juice	4.392	7	3,328	0.000***
Artificially Sweetened Beverages	1.87	7	3,328	0.07
Sugar Sweetened Beverages	15.713	7	3,327	0.000***
Fruit	2.441	7	3,325	0.017*
Vegetables	3.171	7	3,328	0.002**
Potatoes	3.273	7	3,327	0.000***
Other Vegetables	5.345	7	3,258	0.000***
French fries	13.075	7	3,211	0.000***
White bread	5.725	7	3,279	0.000***
Tortillas - White Flour	5.285	7	3,265	0.000***
White Rice	3.522	7	3,288	0.001***
Tortillas - Whole Wheat	7.313	7	3,217	0.000***
Tortillas - Corn	2.857	7	3,273	0.006**
Whole Grain Bread	2.418	7	3,258	0.018*
Brown Rice	2.528	7	3,245	0.014*
Oatmeal	0.997	7	3,281	0.431

Note: * $p<.05$, ** $p<.01$, *** $p< .001$

One-way Analysis of Variance (ANOVA) (Table 14a) was used to compare mean scores on the three variables for which equality of variance was assumed. The analyses failed to identify significant effects of age on average daily consumption of fruits and vegetables (F (7; 3,254) =1.26, p=0.26, η^2=0.00); artificially sweetened beverages (F (7; 3,328) =1.05, p=0.39, η^2=0.00); and oatmeal (F (7; 3,281) =1.76, p=0.09, η^2=0.00).

Table 14a. One-way ANOVAs of daily average of fruit and vegetables consumption by age group.

Daily Average Consumption		Sum of Squares	df	F	η^2	Sig.
Fruits & Vegetables	Between Groups	77.29	7	1.26	0	0.26
	Within Groups	28,438.53	3,254			
	Total	28,515.82	3,261			
Artificially Sweetened Beverages	Between Groups	5.3	7	1.05	0	0.39
	Within Groups	2,405.45	3,328			
	Total	2,410.75	3,334			
Oatmeal	Between Groups	4.62	7	1.76	0	0.09
	Within Groups	1,227.46	3,281			
	Total	1,232.07	3,288			

Note: * $p<.05$, ** $p<.01$.

Non-parametric Kruskal-Wallis (Hollander & Wolfe, 1999; Noether, 1991) tests were performed for those variables where equal variances were not assumed (Table 14b). The tests, which were corrected for tied ranks, showed significant differences by age groups on the median consumption of sugar sweetened beverages (H (7, $N = 3,335$) = 62.64, $p = .0001$; $\eta^2=0.02$), potatoes (H (7, $N = 3,335$) = 23.89, $p = .001$; $\eta^2=0.01$), French fries (H (7, $N = 3,219$) = 97.63, $p = .001$; $\eta^2=0.03$), white bread (H (7, $N = 3,287$) = 50.35, $p = .0001$; $\eta^2=0.02$), white flour tortillas (H (7, $N = 3,273$) = 48.61, $p = .0001$; $\eta^2=0.02$), whole wheat tortillas (H (7, $N = 3,225$) = 23.97, $p = .001$; $\eta^2=0.01$), corn tortillas (H (7, $N = 3,281$) = 72.31, $p = .0001$; $\eta^2=0.02$), and whole grain bread (H (7, $N = 3,266$) = 25.27, $p = .001$; $\eta^2=0.01$).

Table 14b. Kruskal-Wallis tests of daily average of fruit and vegetables consumption by age group.

Daily Average Consumption	N	Median	df	*H*	η^2	Sig.
Fruit Juice	3,336	1	7	8.09	0	0.325
Sugar Sweetened Beverages	3,335	0.25	7	62.64	0.02	0.000***
Fruit	3,333	1	7	10.52	0	0.161
Vegetables	3,336	0.5	7	10.7	0	0.152
Potatoes	3,335	0.25	7	23.89	0.01	0.001**
French fries	3,219	0.25	7	97.63	0.03	0.000***
White bread	3,287	0.25	7	50.35	0.02	0.000***
White Flour Tortillas	3,273	0.25	7	48.61	0.02	0.000***
White Rice	3,296	0.25	7	10.75	0	0.15
Whole Wheat Tortillas	3,225	0	7	23.97	0.01	0.001**
Corn Tortillas	3,281	0.5	7	72.31	0.02	0.000***
Whole Grain Bread	3,266	0.25	7	25.27	0.01	0.001**
Brown Rice	3,253	0	7	6.96	0	0.433

Note: * $p<.05$, ** $p<.01$. *** $p< .001$

Post-hoc analyses using Mann-Whitney U tests (Fay & Proschan, 2010; Armitage, et al., 2008; Lehman, 1975) with Bonferroni correction of *p*-values to conduct reasonable inference of statistical significance (Wilkinson et al, 1999; Thompson, 2008; p 308) were performed.

The Bonferroni correction sets an upper bound on the family wise error rate, to avoid type I errors, and involves using a new test wise α level computed by dividing α level by the number of tests in the study (Hochberg, 1998); in this particular analysis, *p*-value/number of tests (0.05/36 = 0.0014).

Results indicated that the mean consumption of sugar sweetened beverages, fruit juice, French fries, and white bread were significantly higher for the younger age groups whereas mean consumption of corn tortillas and whole grain bread were higher for the older age groups. Because there were significant differences in the consumption of foods by age, H_{02i}, was rejected and H_{2i} was retained.

Consumption of food by level of education

Further exploration of food and beverage consumption patterns among respondents examined level of education. Respondents were classified in 8 groups according to their years of formal education: 1 to 6; 7 to 9; 10 to 12 years; high school graduate; GED diploma; some college years; associate or technical degree; and bachelor's degree or higher.

As shown in Table 15, a Levene test for equality of variances was performed and equality was assumed for the consumption of other vegetables (F (7; 3,138) =1.17, p=0.38). Significant differences in variances among all the other variables were found, hence inequalities in their variances were assumed.

Table 15. Test of homogeneity of variances of daily average of fruit and vegetables consumption by level of education.

Daily Average Servings	Levene's Statistic	df1	df2	Sig.
Fruits & Vegetables Daily Consumption	2.416	7	3,135	0.018*
Fruit Juice	2.615	7	3,202	0.01***
Artificially Sweetened Beverages	2.728	7	3,202	0.008**
Sugar Sweetened Beverages	8.02	7	3,201	0.000***
Fruit	8.608	7	3,200	0.000***
Vegetables	5.487	7	3,202	0.000***
Potatoes	3.894	7	3,201	0.000***
Other Vegetables	1.172	7	3,138	0.38
French fries	7.599	7	3,094	0.000***
White bread	7.303	7	3,157	0.000***
Tortillas - White Flour	7.759	7	3,143	0.000***
White Rice	8.077	7	3,164	0.000***
Tortillas - Whole Wheat	11.258	7	3,097	0.000***
Tortillas - Corn	28.119	7	3,152	0.000***
Whole Grain Bread	2.728	7	3,140	0.008**
Brown Rice	9.206	7	3,125	0.000***
Oatmeal	6.207	7	3,159	0.000***

Note: * $p<.05$, ** $p<.01$, *** $p<0.001$.

A one-way ANOVA (Table 15a) was performed on the consumption of other vegetables and no significant effect of level of education was found on mean consumption ($F= (7; 3,138) = 0.49$, $p=0.84$; $\eta^2=0.00$).

Table15a. One-way ANOVAs of daily average of fruit and vegetables consumption by level of education.

Daily Average Consumption		Sum of Squares	df	F	η^2	Sig.
Other Vegetables	Between Groups	2.62	7	0.49	0	0.84
	Within Groups	2,389.42	3,138			
	Total	2,392.04	3,145			

Note: * $p<.05$, ** $p<.01$.

Kruskal-Wallis tests were used to compare all for all the other variables (Table 15b). This analysis identified main effects of the level of education on daily consumption of fruits and vegetables with respect to the consumption of fruit juice (H (7, $N = 3,210$) = 49.16, $p = .0001$; $\eta^2=0.01$), sugar sweetened beverages (H (7, $N = 3,209$) = 32.36, $p = .0001$; $\eta^2=0.01$), fruit (H (7, $N = 3,208$) = 16.56, $p = .02$; $\eta^2=0.00$), French fries (H (7, $N = 3,102$) = 23.82, $p = .001$; $\eta^2=0.01$), white bread (H (7, $N = 3,165$) = 42.58, $p = .0001$; $\eta^2=0.01$), white flour tortillas (H (7, $N = 3,151$) =24.36, $p = .001$; $\eta^2=0.01$), , corn tortillas (H (7, $N = 3,160$) = 313.28, $p = .0001$; $\eta^2=0.10$), whole grain bread (H (7, $N = 3,148$) = 20.94, $p = .004$; $\eta^2=0.01$), brown rice (H (7, $N = 3,133$) = 41.92, $p = .0001$; $\eta^2=0.01$) and oatmeal (H (7, $N = 3,167$) = 14.37, $p = .0001$; $\eta^2=0.00$).

Table 15b. Kruskal-Wallis tests of daily average of fruit and vegetables consumption by level of education.

Daily Average Consumption	N	Median	df	*H*	η^2	Sig.
Fruit & Vegetables Daily Consumption	3,143	2.75	7	4.61	0	0.708
Fruit Juice	3,210	1	7	49.16	0.01	0.000***
Artificially Sweetened Beverages	3,210	0.25	7	2.69	0	0.912
Sugar Sweetened Beverages	3,209	0.25	7	32.36	0.01	0.000***
Fruit	3,208	1	7	16.56.	0	0.02*
Vegetables	3,210	0.5	7	2.33	0	0.939
Potatoes	3,209	0.25	7	10.83	0	0.146
French fries	3,102	0.25	7	23.82	0.01	0.001**
White bread	3,165	0.25	7	42.58	0.01	0.000***
Tortillas - White Flour	3,151	0.25	7	24.36	0.01	0.001**
White Rice	3,172	0.25	7	11.36	0	0.124
Tortillas - Whole Wheat	3,105	0	7	12.09	0	0.098
Tortillas - Corn	3,160	0.5	7	313.28	0.1	0.000***
Whole Grain Bread	3,148	0.25	7	20.94	0.01	0.004**
Brown Rice	3,133	0	7	41.92	0.01	0.000***
Oatmeal	3,167	0.25	7	14.37	0	0.000***

Note: * p<.05, ** p<.01, *** p< .001

Note: * p<.05, ** p<.01, *** p< .001

Follow-up tests evaluated pair wise differences among the three groups, controlling for Type I error across tests by using the Bonferroni correction (p-value/number of tests= 0.05/28 = 0.002). Results identified a significant difference between respondents by level of education where the consumption of fruit juice, French fries, white bread, and white flour tortillas was higher among those with higher levels of education while, conversely, the consumption of corn tortillas, brown rice, and oatmeal was higher among those with lower levels of education. Because there were significant differences in the consumption of foods by level of education, H_{02ii}, was rejected and H_{2ii} was retained.

Consumption of food by employment

Patterns of consumption of fruits and vegetables were assessed based on employment statues: unemployed; part-time employed and full-time employed. As shown in Table 16, equal variances were assumed for consumption of potatoes (F (2; 3,308) = 0.039, p=0.96), other vegetables (F (2; 3,244) = 1.818, p=0.16), French fries (F (2; 3,196) = 1.012, p = 0.36), and white bread (F (2; 3,260) = 1.346, p=0.26). For these variables, one-way ANOVA was performed.

Table 16. Test of homogeneity of variances of daily average of fruit and vegetables consumption by employment.

Daily Average Servings	Levene's Statistic	df1	df2	Sig.
Fruits & Vegetables Daily Consumption	4.05	2	3,240	0.018*
Fruit Juice	9.796	2	3,309	0.000***
Artificially Sweetened Beverages	7.597	2	3,309	0.001**
Sugar Sweetened Beverages	3.453	2	3,308	0.032*
Fruit	22.888	2	3,306	0.000***
Vegetables	8.712	2	3,309	0.000***
Potatoes	0.039	2	3,308	0.962
Other Vegetables	1.818	2	3,244	0.163
French fries	1.012	2	3,196	0.363
White bread	1.346	2	3,260	0.26
Tortillas - White Flour	3.727	2	3,248	0.024*
White Rice	3.764	2	3,248	0.023*
Tortillas - Whole Wheat	8.519	2	3,200	0.000***
Tortillas - Corn	71.01	2	3,255	0.000***
Whole Grain Bread	13.796	2	3,243	0.000***
Brown Rice	8.605	2	3,231	0.000***
Oatmeal	4.105	2	3,263	0.017*

Note: * p<.05, ** p<.01, *** p<.001

One-way ANOVA (Table 16a) identified a significant effect of employment status on the mean consumption of French fries (F= (2; 3,196) = 3.22, p=0.04; η^2=0.00) but not on the mean consumption of potatoes (F= (2; 3,308) = 0.56, p=0.57; η^2=0.00), other vegetables (F= (2; 3,244) = 0.46, p=0.63; η^2=0.00), and white bread (F= (2; 3,260) = 0.55, p=0.58; η^2=0.00).

Table 16a. One-way ANOVAs of daily average of fruit and vegetables consumption by employment.

Daily Average Consumption		Sum of Squares	df	F	η^2	Sig.
French Fries	Between Groups	2.66.	2	3.224	0	0.04
	Within Groups	1,316.23	3,196			
	Total	1,318.89	3,198			
Potatoes	Between Groups	0.46	2	0.56	0	0.57
	Within Groups	1,344.29	3,308			
	Total	1,344.75	3,310			
Other Vegetables	Between Groups	0.7	2	0.46	0	0.63
	Within Groups	2457.95	3,244			
	Total	2458.65	3,246			
White Bread	Between Groups	0.66	2	0.55	0	0.58
	Within Groups	1,950.15	3,260			
	Total	1,950.81	3,262			

Note: * p<.05, ** p<.01

Tukey's Post-Hoc comparison test (Thompson, 2008; p 328-329) revealed that the mean consumption of French fries was higher for those who were employed part-time than either those who were employed full-time or those who were unemployed. Mean consumption of French fries was not statistically significant between full-time and unemployed respondents (95% confidence interval). For all other variables, Kruskal-Wallis tests were performed (Table 16b). Results of these analyses revealed main effects

of employment on the daily consumption of fruit and vegetables (H (2, N = 3,243) = 7.89, p = .019; η^2= 0.03); fruit juice (H (2, N = 3,312) = 19.10, p = .0001; η^2= 0.01); artificially sweetened beverages (H (2, N = 3,312) = 7.68, p = .021; η^2= 0.00); sugar sweetened beverages (H (2, N = 3,311) = 7.57, p = .023; η^2= 0.00), fruit (H (2, N = 3,309) = 18.62, p = .0001; η^2= 0.01), white rice (H (2, N = 3,272) = 13.74, p = .001; η^2= 0.00), and corn tortillas (H (2, N = 3,258) = 105.29, p = .0001; η^2= 0.03).

Table 16b. Kruskal-Wallis tests of daily average of fruit and vegetables consumption by employment.

Daily Average Consumption	N	Median	df	*H*	η^2	Sig.
Fruit & Vegetables Daily Consumption	3,243	2.75	2	7.89	0.03	0.019*
Fruit Juice	3,312	1	2	19.1	0.01	0.000**
Artificially Sweetened Beverages	3,312	0.25	2	7.68	0	0.021*
Sugar Sweetened Beverages	3,311	0.25	2	7.57	0	0.023*
Fruit	3,309	1	2	18.62	0.01	0.000**
Vegetables	3,312	0.5	2	1.18	0	0.555
Tortillas - White Flour	3,251	0.25	2	2.4	0	0.429
White Rice	3,272	0.25	2	13.74	0	0.001**
Tortillas - Whole Wheat	3,203	0	2	1	0	0.608
Tortillas – Corn	3,258	0.5	2	105.29	0.03	0.000**
Whole Grain Bread	3,246	0.25	2	4.36	0	0.113
Brown Rice	3,234	0	2	5	0	0.082
Oatmeal	3,266	0.25	2	5.5	0	0.064

Note: * p<.05, ** p<.01, *** p< .001

Follow-up tests were conducted to evaluate pair-wise differences among the three groups. Results of these tests identified a significant differences based on employment status for the consumption of fruit, vegetables, and white rice. Consumption of corn tortillas was higher among the unemployed whereas consumption of sweetened beverages (artificially or naturally) was higher among those with some degree of

employment. Because there were significant differences in the consumption of foods by level of employment, H_{02iii}, was rejected and H_{2iii} was retained.

Consumption of food by ethnic subgroup

For the analysis of consumption of food by ethnicity, respondents were divided into five groups: White Hispanics; Black Hispanics; Native American Hispanics; Pacific Islander Hispanics; and Asian Hispanics. Results of the Levene's test (Table 17) showed that equality of variance was assumed for the consumption of artificially sweetened beverages (F (4; 3,331) = 1.81, p=0.124), other vegetables (F (4; 3,261) = 2.06, p=0.08), whole wheat tortillas (F (4; 3,220) = 0.67, p=0.61), corn tortillas (F (4; 3,276) =2.12, p=0.08), and whole grain bread (F (4; 3,261) =2.07, p=0.08).

Table 17. Test of homogeneity of variances of daily average of fruit and vegetables consumption by ethnic group.

Daily Average Servings	Levene's Statistic	df1	df2	Sig.
Fruits & Vegetables Daily Consumption	3.39	4	3,257	0.009**
Fruit Juice	3.65	4	3,331	0.006*
Artificially Sweetened Beverages	1.81	4	3,331	0.124
Sugar Sweetened Beverages	10.39	4	3,330	0.000***
Fruit	5.12	4	3,328	0.001**
Vegetables	4.19	4	3,331	0.002**
Potatoes	4.58	4	3,330	0.001**
Other Vegetables	2.06	4	3,261	0.08
French fries	8.93	4	3,214	0.000***
White bread	12.33	4	3,282	0.000***
Tortillas - White Flour	12.51	4	3,268	0.000***
White Rice	8.71	4	3,291	0.000***
Tortillas - Whole Wheat	0.67	4	3,220	0.61
Tortillas – Corn	2.12	4	3,276	0.08
Whole Grain Bread	2.07	4	3,261	0.08
Brown Rice	2.78	4	3,248	0.03*
Oatmeal	4.133	4	3,284	0.002**

Note: * p<.05, ** p<.01, *** p<0.001

One way analysis of variance (Table 17a) examining the main effect of ethnic subgroup on these variables showed that consumption of corn tortillas did vary by ethnic subgroup (F= (4; 3,276) = 2.99, *p*=0.02). Tukey's Post-Hoc test indicated that the mean consumption of corn tortillas for white Hispanics was higher than for all other ethnic subgroups but this was not statistically significant.

Further examination of patterns of consumption, showed that there was not a main effect of ethnic subgroups on the consumption of artificially sweetened beverages (F= (4; 3,331) = 1.13, *p*=0.338); other vegetables (F= (4; 3,261) = 0.62, *p*= 0.648), whole wheat tortillas (F= (4; 3,220) = 0.38, *p*=0.82) and whole grain bread (F= (4; 3,261) = 0.22, *p*=0.93).

Table 17a. One-way ANOVAs of daily average of fruit and vegetables consumption by ethnic group.

Daily Average Consumption		Sum of Squares	Df	F	η^2	Sig.
Artificially Sweetened Beverages	Between Groups	3.28	4	1.13	0	0.34
	Within Groups	2,407.47	3,331			
	Total	2,410.75	3,335			
Other Vegetables	Between Groups	1.88	4	0.62	0	0.65
	Within Groups	2,467.94	3,261			
	Total	2,469.82	3,265			
Tortillas – Whole Wheat	Between Groups	0.62	4	0.38	0	0.82
	Within Groups	1,295.69	3,220			
	Total	1,296.31	3,224			
Corn Tortillas	Between Groups	13.91	4	2.99	0	0.02
	Within Groups	3,815.28	3,276			
	Total	3,829.19	3,280			
Bread – Whole Grain	Between Groups	0.63	4	0.22	0	0.93
	Within Groups	2,356.29	3,261			
	Total	2,356.92	3,265			

Note: * $p<.05$, ** $p<.01$

Kruskal-Wallis tests were performed (Table 17b) on those variables for which inequality of variances was assumed. Main effects of ethnic subgroups on consumption were found for the consumption of fruit juice (H (4, N = 3,336) = 30.45, p = .0001; η^2=0.01), sugar sweetened beverages (H (4, N = 3,335) = 26.80, p = .0001; η^2=0.01), potatoes (H (4, N = 3,335) = 13.36, p = .01; η^2=0.00), French fries (H (4, N = 3,219) = 26.91, p = .0001; η^2=0.01), white flour tortillas (H (4, N = 3,273) = 38.70, p = .0001; η^2=0.01), corn tortillas (H (4, N = 3,281) = 17.42, p = .002; η^2=0.01), and oatmeal (H (4, N = 3,289) = 10.67, p = .03; η^2=0.00).

Table 17b. Kruskal-Wallis tests of daily average of fruit and vegetables consumption by ethnic group.

Daily Average Consumption	N	Median	df	*H*	η^2	Sig.
Fruit & Vegetables Daily Consumption	3,262	2.75	4	8.74	0	0.68
Fruit Juice	3,336	1	4	30.45	0.01	0.000***
Sugar Sweetened Beverages	3,335	0.25	4	26.8	0.01	0.000***
Fruit	3,333	1	4	5.76	0	0.22
Vegetables	3,336	0.5	4	7.26	0	0.12
Potatoes	3,335	0.25	4	13.36	0	0.01**
Other Vegetables	3,266	0.25	4	1.88	0	0.76
French fries	3,219	0.25	4	26.91	0.01	0.000***
White bread	3,287	0.25	4	34.78	0.01	0.000***
Tortillas - White Flour	3,273	0.25	4	38.7	0.01	0.000***
White Rice	3,296	0.25	4	8.77	0	0.07
Tortillas - Corn	3,281	0.5	4	17.42	0.01	0.002**
Brown Rice	3,253	0	4	3.5	0	0.48
Oatmeal	3,289	0.25	4	10.67	0	0.03

Note: * p<.05, ** p<.01, *** p< .001

Post-hoc tests using Mann-Whitney U tests with Bonferroni correction revealed that the mean consumption of fruit juice and French fries were significantly higher for black Hispanics than white Hispanics. Similarly, the mean consumption of fruit juice,

French fries, and white bread was significantly higher among Native American Hispanics than white Hispanics. Asian Hispanics had significantly higher mean consumption of fruit juice than white Hispanics and Native American Hispanics. Consumption of corn tortillas was significantly higher among white Hispanics than among Native American Hispanics and Pacific Islander Hispanics. Because there were significant differences in the consumption of foods by ethnic subgroups, H02iv, was rejected and H2iv was retained.

Consumption of food by area of residence, border or non-border

Table 18 shows the results of a Student's t-test for independent samples (Thompson, 2008). Independent sample t-tests were conducted to evaluate whether mean consumption of food differed significantly as a function of residing in a border or non-border area. Level of significance was set at 5% (α= 0.05).

Although the mean consumption of artificially sweetened beverages (M = 0.60, SD = 0.87), potatoes (M = 0.48, SD = 0.61) and whole wheat tortillas (M = 0.27, SD = 0.59) was higher for respondents living in border areas, it was not significantly different than for residents of non-border areas (M = 0.54, SD = 0.86; M = 0.46, SD = 0.65; and M = 0.26, SD = 0.62 respectively).

Table 18. Consumption of fruit and vegetables by border or non-border area of residence.

Daily Average Servings	Border		Non-border						95& CI	
	Mean	SD	Mean	SD	df	*t*	*D*	Sig.	Lower	Upper
F&V Average	3.51	2.86	3.7	3	2,952	1.59	0.06	0.11	-0.04	0.43
Fruit Juice	1.17	1.1	1.3	1.19	3,003	2.783	0.1	.01**	0.04	0.22
Art. Swt. Bvrgs	0.6	0.87	0.54	0.86	3,003	-1.868	-0.07	0.06	-0.13	0
Sgr. Swt. Bvrgs	0.87	1.07	0.88	1.13	3,003	0.149	0.01	0.88	-0.08	0.09
Fruit	1.26	1.16	1.36	1.21	3,002	2.188	0.08	.03*	0.01	0.2
Vegetables	1.12	1.08	1.15	1.12	3,003	0.577	0.02	0.56	-0.06	0.11
Potatoes	0.48	0.61	0.47	0.65	3,002	-0.33	-0.01	0.74	-0.06	0.04
Other Vegetables	0.65	0.79	0.7	0.88	2,954	1.57	0.06	0.12	-0.01	0.12
French Fries	0.42	0.59	0.44	0.67	2,925	0.778	0.03	0.44	-0.03	0.07
White Bread	0.45	0.67	0.56	0.81	2,976	3.579	0.13	.00***	0.05	0.17
White Flour Tortillas	0.47	0.68	0.47	0.76	2,963	0.203	0.01	0.84	-0.05	0.06
White Rice	0.38	0.51	0.43	0.64	2,974	2.095	0.08	.04*	0	0.1
Whl. Wht. Tortillas	0.27	0.59	0.26	0.62	2,933	-0.111	0	0.91	-0.05	0.05
Corn Tortillas	0.9	1	1	1.07	2,963	1.894	0.07	0.06	0	0.16
Whl. Grn. Bread	0.64	0.81	0.68	0.87	2,961	1.184	0.04	0.24	-0.03	0.11
Brown Rice	0.2	0.47	0.22	0.51	2,953	1.023	0.04	0.31	-0.02	0.06
Oatmeal	0.39	0.55	0.39	0.63	2,976	0.222	0.01	0.82	-0.04	0.05

Note: * $p<.05$, ** $p<.01$

However, among residents of non-border areas, mean consumption of fruit juice (M_{fjnb} = 1.30, SD_{fjnb} = 1.19), Fruit (M_{fnbr} = 1.36, SD_{fnb}= 1.21), white bread (M_{wbnb} = 0.56, SD_{wbnb} = 0.81), and white rice (M_{wbnb} = 0.43, SD_{wbnb} = 0.64) were significantly higher than the average consumption of residents in the border areas (M_{fjnb} = 1.17, SD_{fjnb} = 1.10), (M_{fnbr} = 1.26, SD_{fnb}= 1.16); (M_{wbnb} = 0.45, SD_{wbnb} = 0.67) and (M_{wbnb} = 0.38, SD_{wbnb} = 0.51) with $t_{fjnb}(3,003) = 2.783$, p= .01, d = 0.10 (0.04-0.22); $t_{fnb}(3,002) = 2.188$; p= .03, d = 0.08 (0.01-0.20); $t_{wbnb}(2,976) = 3.579$, p = .0001, d = 0.13 (0.05-0.17); and $t_{wrnb}(2,974) = 2.095$, p = .04, d = 0.08 (0.00-0.10), respectively. Because there were significant differences in the mean consumption of foods by area of residence, H_{02v}, was rejected and H_{2v} was retained.

Consumption of food by acculturation

Respondents were classified into three categories of acculturation: low acculturated, bilingual, and high acculturated. Low acculturated respondents were those who responded to the survey in Spanish and predominantly used the Spanish language at home. Bilingual individuals were those who responded that they used both English and Spanish languages at home and preferred to respond to the survey using indistinctively the Spanish or the English version. High acculturated individuals were those responding to the survey in English and for whom English was the preferred language at home.

Before conducting the comparative analyses, a test for homogeneity of variances using the Levene's method was performed (Table 19). The only food for which there homogeneity of variances was assumed was for the consumption of white rice ($F(2; 3,293) = 0.20$, p=0.82).

Table 19. Test of homogeneity of variances of daily average of fruit and vegetables consumption by acculturation.

Daily Average Servings	Levene's Statistic	df1	df2	Sig.
Fruits & Vegetables Daily Consumption	13.84	2	3,259	0
Fruit Juice	7.14	2	3,333	0.001
Artificially Sweetened Beverages	20.64	2	3,333	0
Sugar Sweetened Beverages	113.22	2	3,332	0
Fruit	8.47	2	3,330	0
Vegetables	29.28	2	3,333	0
Potatoes	10.14	2	3,332	0.008
Other Vegetables	4.79	2	3,263	0
French fries	46.65	2	3,216	0
White bread	41.69	2	3,284	0
Tortillas - White Flour	17.25	2	3,270	0
White Rice	0.2	2	3,293	0.821
Tortillas - Whole Wheat	13.92	2	3,222	0
Tortillas – Corn	235.97	2	3,278	0
Whole Grain Bread	3.04	2	3,263	0.048
Brown Rice	27.78	2	3,250	0
Oatmeal	13.56	2	3,286	0

Note: * $p<.05$, ** $p<.01$, *** $p<0.001$

One-way ANOVA (Table 19a) failed to identify a significant effect of acculturation on the mean consumption of white rice ($F(2; 3,293) = 2.52$; $p= 0.08$; $\eta^2 = 0.00$).

Table19a. One-way ANOVAs of daily average of fruit and vegetables consumption by acculturation.

Daily Average Consumption		Sum of Squares	Df	F	η^2	Sig.
White Rice	Between Groups	1.94	2	2.52	0	0.08
	Within Groups	1,270.82	3,293			
	Total	1,272.76	3,295			

Kruskal-Wallis tests were used to compare consumption patterns for all other foods by acculturation (Table 19b). Main effects of Acculturation were found on the consumption of fruit juice (H (2, N = 3,336) = 12.73, p = .002; η^2=0.00), sugar sweetened beverages (H (2, N = 3,335) = 107.58, p = .0001; η^2=0.03), fruit (H (2, N = 3,333) = 20.76, p = .0001; η^2=0.01), vegetables (H (2, N = 3,336) = 7.64, p = .02; η^2=0.00), potatoes (H (2, N = 3,335) = 11.04, p = .004; η^2=0.00), French fries (H (2, N = 3,219) = 96.15, p = .0001; η^2=0.03).

Similar results were found for white bread (H (2, N = 3,287) = 94.60, p = .0001; η^2=0.03), white flour tortillas (H (2, N = 3,273) = 56.00, p = .0001; η^2=0.02), whole wheat tortillas (H (2, N = 3,225) = 25.10, p = .0001; η^2=0.01), corn tortillas (H (2, N = 3,281) = 712.75, p = .0001; η^2=0.22), brown rice (H (2, N = 3,253) = 37.10, p = .0001; η^2=0.01), and oatmeal (H (2, N = 3,289) = 22.97, p = .0001; η^2=0.01).

Table 19b. Kruskal-Wallis tests of daily average of fruit and vegetables consumption by acculturation.

Daily Average Consumption	N	Median	df	*H*	η^2	Sig.
Fruit & Vegetables Daily Consumption	3,262	2.75	2	5.45	0	0.06
Fruit Juice	3,336	1	2	12.73	0	0.002**
Artificially Sweetened Beverages	3,336	0.25	2	5.7	0	0.06
Sugar Sweetened Beverages	3,335	0.25	2	107.58	0.03	0.000***
Fruit	3,333	1	2	20.76	0.01	0.000***
Vegetables	3,336	0.5	2	7.64	0	0.02*
Potatoes	3,335	0.25	2	11.04	0	0.004**
French Fries	3,219	0.25	2	96.15	0.03	0.000***
White bread	3,287	0.25	2	94.59	0.03	0.000***
Tortillas - White Flour	3,273	0.25	2	56	0.02	0.000***
Tortillas - Whole Wheat	3,225	0	2	25.1	0.01	0.000***
Tortillas – Corn	3,281	0.5	2	712.75	0.22	0.000***
Brown Rice	3,253	0	2	37.1	0.01	0.000***
Oatmeal	3,289	0.25	2	22.97	0.01	0.000***

Note: * $p<.05$, ** $p<.01$. *** $p< .001$

Post-hoc comparisons using Mann-Whitney U with Bonferroni correction (*p*-value/number of tests = 0.05/3 = 0.016) were performed. Results of these tests indicated that the mean consumption of corn tortillas, brown rice and oatmeal were significantly higher among those with a low level of acculturation than those at high and bilingual levels of acculturation. Respondents at a high level of acculturation showed significantly higher mean consumption of white bread, French fries and sugar sweetened beverages than respondents who were at low and bilingual levels of acculturation. Respondents at a bilingual level of acculturation showed a significantly higher mean consumption pattern of whole wheat tortillas compared to respondents at low and high levels of acculturation.

In summary, level of acculturation did have a main significant effect on differences in consumption patterns of fruit and vegetables. Because there were significant differences in the consumption of foods by level of acculturation, H_{01}, was rejected and H_1 was retained.

Logistic regression

The null hypothesis tested through this logistic regression was "There are no differences in food consumption patterns by levels of acculturation among low income Hispanic women living in Texas". Logistic Regression (LR) was used to assess the impact of acculturation and a number of other factors on the likelihood of whether low income Hispanic women would have a healthy or non-healthy pattern of food consumption. Logistic Regression (LR) was performed using IBM® PASW® SPSS® version 18 for Windows® 64 bit. Logistic Regression analysis was performed using Enter Method; food consumption pattern as the outcome variable, and age, level of education, employment, ethnicity, purchase of fruits and vegetables, preparation of meals with fruits and vegetables, area of residence, and level of acculturation as predictors. In this analysis, 84.1% (*N*= 2,768) of cases were included, as 15.9% (*N*=523) were excluded due to missing values (Table 20).

Table 20. Selected cases of food consumption patterns by logistic regression.

Selected & Unselected Cases		N	Percent (%)
Selected Cases	Included	2,768	84.1
	Missing	523	15.9
	Subtotal Selected	3,291	100
Unselected Cases	Subtotal	0	0
Total		3,291	100

In Table 20a, observed and predicted frequencies of food consumption patterns by logistic regression are presented. The logistic regression model classified correctly 73.7% of cases (Table 20a). A sensitivity of 95.02% and a specificity of 15.52% were calculated for the model. In addition, the model identified a 24.53% chance of identifying false positives and a 46.76 % chance of doing the same for false negatives.

Table 20a. Observed and predicted frequencies of food consumption patterns by logistic regression.

Observed	Predicted			
	Non-Healthy Consumption Pattern	Healthy Consumption Pattern	Total	Percentage (%) Correct
Non-Healthy Consumption Pattern	1,926	101	2,027	95
Healthy Consumption Pattern	626	115	741	15.5
Total	2,552	216	2,768	
Overall Success Rate (%)				73.7

Note: Sensitivity = 95.02%; Specificity = 15.52%; False Positive = 24.53%; False Negative: 46.76%.

The full model (Table 20b) was statistically significant (χ^2 (22) = 382.96, p = 0.0001) indicating the model's capacity to identify differences between respondents reporting healthy or non-healthy food consumption patterns. Goodness of fit by the Hosmer & Lemeshow test was also statistically significant (χ^2 (8) = 17.83, p = 0.02). The model, when taken comprehensively, explained between 13.0% (Cox and Snell R^2 = 0.129) and 19.0% (Nagelkerke R^{2n} = 0.188) of the total variance in food consumption patterns depending on which one of the effect size measures is considered.

Table 20b. Overall evaluation model of food consumption patterns by logistic regression analysis.

Test	χ^2	df	Sig.
Omnibus Test of Model Coefficients			
Step	346.25	10	0
Block	346.25	10	0
Model	382.95	22	0
Goodness of Fit			
Hosmer & Lemeshow Test	17.83	8	0.02*

Note: Cox & Snell $R^2 = 0.129$; Nagelkerke $R^2 = 0.188$; Goodman & Kruskal $g = 0.6196$

Four variables made a statistically significant contribution to the model (Table 20c): ethnicity (*OR* = 1.32, *p*= 0.0001, *CI* (1.16-1.50)); acculturation (*OR* = 0.62, *p*= 0.0001, *CI* (0.47-0.82)); purchase of fruits and vegetables, often, (*OR* = 0.288, *p* = 0.0001, *CI* (0.18-0.44)) and always (*OR* = 0.652, *p* = 0.0001, *CI* (0.52-0.81)); and preparation of meals with fruits and vegetables, sometimes (*OR* = 0.32, *p*= 0.0001, *CI* (0.004-0.24)); often (*OR* = 0.248, *p*= 0.0001, *CI* = (0.18-0.34)) and always (*OR* = 0.658, *p*= 0.0001, *CI* (0.53-0.82).

The theoretical model: Logit (p) =$\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots \beta_k X_k$; can be expressed as the logistic regression model:

Predicted Logit (Food Consumption Pattern) = - 0.749 + (0.22)*UNEMPLY + (0.276)*ETHNICITY + (−0.478)*ACCU1 + (−1.245)*BUY3 + (−0.428)*BUY4 + (−3.433)*PREPMEAL2 + (−1.396)*PREPMEAL3 + (−0.418)*PREPMEAL4.

Binomial assumption was assumed to be robust as the sample size is large and observations were independent from each other. The Goodman-Kruskal Gamma test of association of predicted probabilities (γ= 0.6196) indicated that the model had good predictive ability.

The results of this analysis supported the study's hypothesis that less healthy food consumption patterns are associated with higher levels of acculturation among low-income Hispanic women living in Texas. Therefore, the null hypothesis, H_{01}, was rejected and H_1 was retained.

Table 20c. Logistic regression analysis of food consumption patterns by PASW SPSS version 18 binary logistic regression.

Predictor	β	S.E.β	Wald's χ^2	df	Sig.	Odds Ratio	95% C.I. for Odds Lower	Upper
Constant	-0.75	0.38	3.81	1	0.05	0.47	N.A.	N.A.
Age	0.004	-0.007	0.41	1	0.52	1.00	0.99	1.02
Area of Residence B-NB	0.01	0.10	0.01	1	0.92	1.01	0.82	1.24
Level of Education			6.01	7	0.54			
1 - 6 years	-0.1	0.34	0.08	1	0.77	0.91	0.46	1.77
7 - 9 years	0.06	0.30	0.04	1	0.84	1.06	0.59	1.91
10 - 12 years	0.08	0.29	0.07	1	0.79	1.08	0.61	1.91
High School Graduate	0.04	0.29	0.02	1	0.88	1.04	0.6	1.82
G.E.D.	-0.23	0.33	0.45	1	0.48	0.79	0.41	1.52
Some College	-0.18	0.29	0.39	1	0.53	0.83	0.47	1.48
Bachelor's Degree or Higher	-0.20	0.33	0.35	1	0.58	0.82	0.43	1.58
Employment			7.37	2	0.03			
Unemployed	0.22	0.12	3.21	1	0.07	1.25	0.98	1.6
Part-Time Employment	-0.12	0.17	0.47	1	0.49	0.89	0.64	1.24
Ethnicity	0.28	0.06	18.31	1	0.00	1.32	1.16	1.50
Level of Acculturation			22.7	2	0.00			
Low Acculturation	-0.48	0.14	11.71	1	0.00	0.62	0.47	0.82
Biculturalism	0.10	0.11	0.80	1	0.37	1.11	0.89	1.38
Buy Fresh F&V			37.29	4	0.00			
Rarely	-20.33	11,281.78	0.00	1.00	1.00	0.00	0.00	
Sometimes	-19.84	4,674.89	0.00	1.00	1.00	0.00	0.00	
Often	-1.25	0.22	31.65	1.00	0.00	0.28	0.19	0.44
Always	-0.43	0.11	14.45	1.00	0.00	0.65	0.52	0.81
Prepare Meals with F&V			86.72	4.00	0.00			
Rarely	-0.25	0.47	0.29	1.00	0.59	0.78	0.31	1.94
Sometimes	-3.43	1.02	11.33	1.00	0.001	0.03	0.00	0.24
Often	-1.40	0.16	78.5	1.00	0.00	0.25	0.18	0.34
Always	-0.42	0.11	14.00	1.00	0.00	0.66	0.53	0.82

Note: N.A. = Not Applicable.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to examine whether less healthy food consumption patterns are associated with higher levels of acculturation among low-income Hispanic women living in Texas. Measurement of acculturation used language as a proxy; which is an acceptable approach (Link, Mokdad, Stackhouse, Flowers, 2006; Bersamin, Hanni & Winkley, 2008; Carrera, Gao & Tucker, 2007; Dixon, et al., 2000). This approach has both the advantage of ease of use and the disadvantage of being overly simplistic (Grimm & Blanck, 2011; Birman et al., 2002; Birman, 1994; Berry et al., 1987; Norman et al, 2004; Ryder et al., 2000; Negy & Woods, 1992; Cabassa, 2003).

Nonetheless, previous research has identified acculturation as an important predictor of nutritional behaviors, demonstrating that individuals at lower levels of acculturation consume more fruit and vegetables than their higher acculturated counterparts (Grimm & Blanck, 2011; Gregory-Mercado et al., 2007; Murtaugh, Herrick, Sweeney, Baumgartner, Galico, et al., 2007; Neuhouser, et al., 2004; Monroe et al., 2003; Bermúdez, Falcon & Tucker, 2000). This is also true for Hispanics, where there is clear evidence that a link between level of acculturation and consumption of fruit and vegetables exists with higher acculturated Hispanics consuming fewer servings of fruits and vegetables per day (Neuhouser et al., 2004).

Results of this study support these previous findings where level of acculturation had a main significant effect on differences in consumption patterns of fruits, and vegetables with less acculturated Hispanic women consuming more fruits and vegetables (Lara et al., 2005). Subsequently, we confirmed our first hypothesis that higher levels of acculturation are associated with unhealthy food consumption patterns among low-income Hispanic women enrolled in the Texas WIC program.

The second hypothesis explored the relationship between socio-economic (SES) and demographic characteristics (level of education, level of employment, age of respondents, ethnic subgroups and area of residence). This study confirmed that there are significant differences among the socio-economic and demographic measures and food consumption patterns.

Higher educational levels were significantly associated with higher levels of consumption of fruit juice, French fries, white bread, and white flour tortillas. Conversely, levels of consumption of healthier options like corn tortillas, brown rice, and oatmeal were significantly higher for those with lower levels of education. Similarly, healthier consumption patterns of fruit, vegetables, white rice, and corn tortillas were found among the unemployed whereas consumption of sweetened beverages (artificially or naturally) was higher among those with some degree of employment.

Examination of consumption of food by age of respondents also confirmed significant relationships. Consumption of healthier foods like corn tortillas and whole grain was higher for older than younger aged subjects. On the contrary, consumption of

sugar sweetened beverages, fruit juice, French fries, and white bread was significantly higher for younger age groups.

Ethnic background was examined using Hispanics subgroups by country of origin. This study identified significant differences in the consumption of fruit and vegetables between Hispanic women racial subgroups. Consumption of fruit juice and French fries were significantly higher among black Hispanic women than white Hispanics. Similarly, mean consumption of fruit juice, French fries, and white bread were significantly higher among Native American Hispanics than among white Hispanics. Asian Hispanics had significantly higher consumption of fruit juice than white Hispanics and Native American Hispanics. Consumption of corn tortillas was significantly higher among white Hispanics than among Native American Hispanics and Pacific Islander Hispanics.

Given the findings from the SES measures, one can conclude that acculturation effects are modified by SES factors. Generally the dietary impacts of acculturation seem to modify dietary practices. Higher education, being unemployed, older age, and being a white Hispanic were all associated with dietary practices that placed individuals at lower health risk.

Findings from this study confirm that acculturation has significant associations with dietary practices among Hispanic women. Our SES measures confirm previous findings that higher education levels, being older and being a white Hispanic are associated with more positive dietary practices. On the contrary, being employed and being younger is associated with poorer dietary practices.

The logistic regression analysis performed in the study showed that levels of acculturation are indeed associated with the pattern of consumption of fruit and vegetables, more specifically; it showed that low acculturated individuals significantly have a healthier food consumption pattern than those at higher levels of acculturation.

The overall logistic regression model showed a good overall success rate (73.7%) on correctly classifying individuals at their food consumption pattern; indeed, the model had a high sensitivity (95%), identifying correctly those respondents at non-healthy food consumption pattern. However, level of specificity (15.5%) was low; in other words, the model could not effectively identify individuals at a healthy food consumption pattern.

Similarly, the proportion of false positives (24.5%) or individuals incorrectly identified as having non-healthy food consumption pattern; and false negatives (46.8%), individuals incorrectly identified as having a healthy food consumption pattern, were both rather high and lead towards the conclusion that the model presented is sensitive but lacks accuracy. This estimation about accuracy is confirmed by the observed Goodman & Kruskal gamma coefficient "g" (0.62 (Hosmer & Lemeshow, 2000).

The direction of this analysis seems to be confirmed when analyzing the measures of effect-sizes observed for the model, Cox & Snell R2 (0.13) and Nagelkerke R2 = 0.19. These R2 values range between 0 and 1 and the closer to 1 the more accurate the model and vice versa; in this study, both cases the measures of effect-size show a mild relationship between the predictors and the prediction, and therefore we can assume that the model had a low performance (Hosmer & Lemeshow, 2000).

It is unclear if these results are associated with similar findings in other studies because their reports have been published including Odds Ratios (OR), P-critical (P-Value) values, and 95% Confidence Intervals (CI) for predictors but do not report measures of effect sizes of the overall logistic regression models (Grimm & Blanck, 2011; Park et al., 2011; Ghaddar, Brown, Pagan, & Diaz, 2010; Mainous et al., 2008; Gregory-Mercado et al, 2007; Murtaugh et al., 2007; Barcenas, Wilkinson, Strom, Cao, Saunders et al., 2007; Fitzgerald et al., 2006). Only one of these research articles reported the Logistic Regressions' goodness-of-fit Hosmer-Lemeshow (HL) statistics in addition to OR's, P-Value, and CI. HL statistics ranged from 0.62 to 0.84 (Fitzgerald et al., 2006).

Problematic in previous studies of acculturation were the lack of report of effect sizes when examining statistical significance of relationships; therefore, not confirming the strength of the effects of acculturation (Grimm & Blanck, 2011; Park et al., 2011; Ghaddar et al., 2010; Mainous et al., 2008; Gregory-Mercado et al, 2007; Murtaugh et al., 2007; Barcenas, 2007; Fitzgerald et al., 2006).

Unique to the body of work on acculturation, this study examined effect size. Findings confirmed that there is a consistent effect with acculturation, but that this effect is modest. An unanswered question is whether the weaker effect size was a function of using a unidimensional measure of acculturation. Given what has been discussed in the literature, this is a probable factor that diminished the effect size.

Another factor that may have modified effects was that the respondents of the study were predominantly bilingual or well acculturated (although their socio-economic

conditions are not optimal: mostly unemployed with low levels of education). These findings suggest that these women may not have access to information on how to practice healthier eating. It is also possible that environmental conditions to pursue healthier dietary habits were inhibitive.

Conclusions

The association between acculturation and healthy dietary practices is more complex than most authors have documented. Methods to assess levels of acculturation need refinement to clarify precise associations and influences between SES, acculturation and dietary practices. It is imperative to define, conceptualize, and operationalize measurements of acculturation with more generally agreed upon methodology.

Recommendations for Future Research

1. Attempt to standardize definition and operationalization in acculturation research. A necessary future step in this line of research in order to better understand what acculturative factors are amenable to low-income Hispanic women.

2. Attempt to standardize forms of measurement, in acculturation research. Significant discussion and emphasis on measurement issues is paramount to allow future work to build on other studies.

3. Measure and report effect sizes. In order to confirm the importance and influence of acculturation on dietary practices, studies need to report on their effect sizes.

4. Conceptualize studies with SES in mind. SES has consistent associations with acculturation and dietary practices. Future work should build on this consistent influence to allow more precise planning in intervention development.

Implications for Health Educators

There are different implications for pre-service and active service health educators working with Hispanic women. Pre-service health educators should recognize cultural values, beliefs, and the role of acculturation and SES when collecting information and interpreting responses from target audiences.

These are all factors that need to be considered before the development of curricular and educational materials. This practice is of special significance in geographical regions such as Texas where there is a large group of Hispanics who also have substantial subgroupings. Health Educators in active service with Hispanic populations should consider tailoring interventions in accordance with the target audiences' age, level of education, level of acculturation, area of residence, and country of origin. Interventions targeting Hispanics have to consider variations in salient issues of the Hispanic culture depending on the country where participants come from for effective retention of such traits and disregard of the unhealthful ones. For instance, it has been proposed that interventions targeting overweight/obesity among Hispanic women should promote maintenance of traditional healthy Mexican nutritional practices (Ayala et al., 2004).

Implications for Hispanic Women

As it is inferable from the results presented in this document and the correspondent discussion, this research is significant for women in the United States but more especially for low-income Hispanic women. This population subgroup is at higher risk for overweight and obesity because of demographic factors such as unemployment, low educational attainment, access to healthy food choices, and culture factors.

Interventions aimed towards curbing trends in prevalence of overweight and obesity and designed to improve levels of nutritional education, ability to make healthier food choices, and reinforcing the retention of positive aspects of the culture of origin like traditional patterns of cooking or the abundant consumption of fruit and vegetables will have a significant positive effect not only for Hispanic women but their siblings and families as well. Health education interventions that are acceptable and that truly assist Hispanic/Latina women to develop healthy habits should be culturally sensitive to make Latinas to learn and/or improve their cooking skills, food choices, and other factors amenable to healthy nutritional behaviors.

The role of cultural factors such as familismo, fatalism and machismo in eating behaviors should not be ignored and deserve more research efforts in order to understand them better and implementing successful nutrition education programs. Among some Hispanic subgroups, a woman who appears to weigh more than what her BMI categorization indicates is considered a sign of health. In other words, to have some weight beyond a fit appearance is a sign of health.

Likewise, machismo-like beliefs or roles of male dominance are still rooted among Hispanics/Latinos in the US affecting health status among Hispanic/Latina women especially in border areas where exposure to machismo is very strong (Fernandez, McCurdy, Arvey, Tyson, Morales-Campos et al., 2009). Health education has been proposed as an effective mechanism not only to overcome its unhealthy effects of machismo (Quinones-Mayo & Resnick, 1996) but also because it helps Hispanic/Latina women to be more aware of their risks, to increase control over what types of food they choose, the size of the portions to eat, and healthy ways to do food preparation (Chavez-Martinez, Cason, Mayo et al., 2010). It also serves to moderate roles of male dominance.

Interventions should include the acquisition of skills like reading food labels, interpersonal health communication via, for example, promotoras, peer-educators, physicians, and family members. Culturally appropriate interventions should emphasize the healthful nutritional behaviors and promote maintenance of traditional nutritional practices providing them with more autonomy, and more decision-making power/capacity.

Study Strengths and Limitations

This study offers a comprehensive analysis of various foci for acculturation in health-related research and identifies gaps in knowledge. To its credit, the study included a list of validated questions from the 2006 BRFSS which aided to identify important differences within the sample of respondents. This study also sets a baseline for future observations of the same population when changes or adjustments in the foods included

in the WIC program occur. In addition, this study included a large sample of low-income Hispanic women – a difficult to reach population consisting of those who rarely volunteer to participate in research studies. Respondents were recruited from all facilities across the State of Texas where the WIC program operates; participating individuals were not limited to only one or two areas of the state.

Despite its usefulness, this study has also some limitations. First, findings on the association of acculturation with healthy nutrition patterns of low-income Hispanic women living in Texas may not be applicable to other women living in Texas, women living in other states, or in the United States of America as a whole. There is also a lack of representativeness - this study utilized a sample of convenience and focused exclusively on low-income Hispanic women enrolled in the WIC program in Texas. Additional studies are needed to further understand the existing relationships between acculturation and healthy nutritional behaviors in women of Mexican descent. Hence, a lack of robustness and external validity statistically limited the study.

Finally, acculturation was measured using a unidimensional language-based approach and not a multidimensional scale. Given the difference between levels of acculturation, it is likely that we would have found sufficient variability in acculturation level in this population had a validated multidimensional acculturation scale be used. Likewise, discrepancies between prevalence of weight problems between the group of respondents and general female Hispanic population may be due to social desirability probably linked to a willingness of respondents to look good.

Contributions to the Literature

This research will contribute to increased knowledge and understanding about the influence that levels of interaction between Hispanic cultures with US culture has on Hispanic mothers living in Texas. This is an underrepresented and understudied population group that is gaining importance as its share on the US grows rapidly (US Census, 2010).

Likewise, measuring acculturation as a whole with the inclusion of an affective measurement tool should add a dimension that has not been widely explored in health education interventions. Additionally, the uniqueness of this research on making evident that racial differences within Hispanics are significant highlight the importance of not considering Hispanics/Latinos as a monolithic block and to factor in these variations when designing health education programs and interventions.

REFERENCES

Abraido-Lanza, A., Chao, M., & Florez, K. (2005a). Do healthy behaviors decline with greater acculturation? Implications for the Latino mortality paradox. *Social Science & Medicine*, *61*, 1243-1255.

Abraido-Lanza, A., Chao, M., & Gates, C. (2005b). Acculturation and cancer screening among Latinas: Results from the national health interview survey. *Annals of Behavioral Medicine*, *29*(1), 22-28.

Adams, EJ., Grummer-Strawn, L., & Chavez, G. (2003). Food insecurity is associated with increased risk of obesity in California. *Women Journal of Nutrition*, *133*(4), 1070-1074.

Allison, P. (2000). Multiple imputations for missing data: A cautionary tale. *Sociological Methods and Research*, *28*(2), 301-309.

Allison, P. (2001). *Missing data*. Thousand Oaks, CA: Sage Publications.

Amaro, H., & De la Torre, A. (2002). Public health needs and scientific opportunities in research on Latinas. *American Journal of Public Health, 92*(4), 525-529.

Arcia E., Skinner, M., Bailey, D., & Correa, V. (2001). Models of acculturation and health behaviors among Latino immigrants to the US. *Social Science and Medicine, 3*(1), 41-53.

Arends-Tóth, JV., & Van de Vijver, FJR. (2006). *Issues in conceptualization and assessment of acculturation*. In M. H. Bornstein & L. R. Cote (Eds.), *Acculturation*

and parent-child relationships: Measurement and development (pp. 33-62). Mahwah, NJ: Erlbaum.

Armitage, P., Berry, G., & Matthews, J. (2008). *Statistical methods in medical research*, Fourth Edition, Oxford, UK: Blackwell Science Ltd.

Arredondo, E., Elder, J., Ayala, G., Slymen, D., & Campbell, N. (2006). Association of traditional vs shared meal decision-making and preparation style with eating behavior of Hispanic women in San Diego County. *Journal of the American Dietetic Association, 106*(1), 38-45.

Atehortua, NA. & McKyer, ELJ. (2009a). Maternal perceptions of offspring's weight status (MPOWS) around the world: A comprehensive review of the literature. *60th Annual Meeting of the Society for Public Health Education*, Philadelphia, PA. November 5–7, 2009.

Atehortua, NA., & McKyer, ELJ. (2009b). Acculturation as a variable in health promotion and health education research: A comprehensive review. *9th Annual Scientific Meeting of the American Academy of Health Behavior*. Hilton Head, SC., March 8-11, 2009.

Auerbach, S. (2006). "If the Student Is Good, Let Him Fly": Moral Support for College Among Latino Immigrant Parents. *Journal of Latinos and Education, 5*(4), 275-292.

Ayala, G., Baquero, B., & Klinger, S. (2008). A Systematic review of the relationship between acculturation and diet among Latinos in the United States: Implications

for future research. *Journal of the American Dietetic Association*, *108*(8), 1330-1344.

Ayala, G., Elder, P., Campbell, N., Slymen, D., Roy, N., et al. (2004). Correlates of body mass index and waist-to-hip ratio among Mexican women in the United States: Implications for intervention development. *Women's Health Issues*, *14*(5), 155-164.

Bacallao, ML., & Smokowski, PR. (2005). Entre dos mundos (between two worlds): Bicultural skills training with Latino immigrant families. *The Journal of Primary Prevention*, *26*(6), 485-509.

Bakhireva, L., Young, B., Dalen, J., Phelan, S., & Rayburn, W. (2009). Periconceptional binge drinking and acculturation among pregnant Latinas in New Mexico. *Alcohol*, *43*(6), 475-481.

Barcenas CH., Wilkinson AV., Strom SS., Cao, Y., Saunders, KC., et al. (2007). Birthplace, years of residence in the United States, and obesity among Mexican-American adults. *Obesity*, *15*, 1043–1052.

Bartholomew, JB., Miller, BM., Ciccolo, JT., Atwood, R., & Gottlieb, NH. (2008). Walk Texas! 5-A-Day Intervention for Women, Infant, and Children (WIC) Clients: A Quasi-experimental Study. *Journal of Community Health, 33*, 297–303.

Bender, D., & Castro, D. (2000). Explaining the birth weight paradox: Latina immigrants' perceptions of resilience and risk. *Journal of Immigrant Health*, *2*(3), 155-173.

Berkowitz, D., Bao, Y. & Allaway, A. (2005). Hispanic consumers, store loyalty and brand preference. *Journal of Targeting, Measurement and Analysis for Marketing*; *14*, 9-24.

Bermudez, OI., Falcón, LM., & Tucker, KL. (2000). Intake and food sources of macronutrients among older Hispanic adults: Association with ethnicity, acculturation, and length of residence in the United States. *Journal of the American Dietetic Association, 100*(6), 665–673.

Berry, J.W. (1997). Immigration, acculturation, and adaptation. *Applied Psychology: An International Review*, *46*(1). 10

Berry, JW. (1980). *Acculturation as varieties of adaptation*, in A. Padilla (Ed), *Acculturation: Theory, models and some new findings* (pp. 9-25). Boulder, CO: Westview.

Berry, JW. (2003). *Conceptual approaches to acculturation*. In K. Chun, P. Balls-Organista, & G. Marin (Eds.), *Acculturation: Advances in theory, measurement and applied research* (pp. 17-37). Washington, DC: American Psychological Association.

Berry, JW., Kim, U., Minde, T., & Mok, D. (1987). Comparative studies of acculturative stress. *International Migration Review, 21*, 491-511.

Bersamin, A., Hanni, KD., & Winkley, MA. (2008). Predictors of trying to lose weight among overweight and obese Mexican-Americans: A signal detection analysis. *Public Health Nutrition, 12*(1), 64-73.

Beyene, Y., Becker, G., Mayen, N. (2002). Perception of aging and sense of well-being among Latino elderly. *Journal of Cross-Cultural Gerontology. 17* (2), 155-172.

Birman, D. (1994). *Acculturation and human diversity in a multicultural society*. In E. J. Trickett, R. J. Watts, & D. Birman (Eds.), *Human diversity: Perspectives on people in context* (pp. 261-284). San Francisco, CA: Jossey-Bass.

Birman, D., Trickett, E. J., & Vinokurov, A. (2002). Acculturation and adaptation of Soviet Jewish refugee adolescents: Predictors of adjustment across life domains. *American Journal of Community Psychology, 30*, 585-607.

Blanck, HM., Gillespie, C., Kimmons, JE., Seymour, JD., & Serdula, MK. (2008). Trends in fruit and vegetable consumption among U.S. men and women, 1994–2005. *Preventing Chronic Disease*, *5*(2), 1-10.

Boeckner, L., Jordan, S., & Schnepf, M. (2000). The use of an ethnic food frequency questionnaire among Hispanic women. *Great Plains Research*, *10*(2), 295-304.

Boeckner, L., Pullen, C., Walker, S., & Hageman, P. (2006). Differences in eating and activity behaviors, health history, and biomarkers among normal-weight, overweight, and obese rural Midwestern Hispanic women. *Journal of the American Dietetic Association*, *106*(11), 1870-1874.

Borrayo, E., Thomas, J., & Lawsin, C. (2004). Cervical cancer screening among Latinas: The importance of referral and participation in parallel cancer screening behaviors. *Women and Health, 39*(2), 13-29.

Bothwell, E., Ayala, G., Conway, T., Rock, C., Gallo, L., et al. (2009). Underreporting of food intake among Mexican/Mexican-American women: Rates and correlates. *Journal of the American Dietetic Association*, *109*(4), 624-632.

Briefel, RR., & Johnson, CL. (2004). Secular trends in dietary intake in the United States. *Annual Review of Nutrition, 24*, 401–431.

Britten, P., Marcoe, K., Yamini, S., & Davis, C. (2006). Development of food intake patterns for the MyPyramid food guidance system. *Journal of Nutrition Education and Behavior, 38*, S78-S92.

Brown, J., Villaruel, A., Oakley, D., & Eribes, C. (2003). Exploring contraceptive pill taking among Hispanic women in the United States. *Health Education and Behavior*, *30*(6), 663-682.

Burnam, M., Telles, C., Karno, M., Hough, R. & Escobar, J. (1987). Measurement of acculturation in a community population of Mexican Americans. *Hispanic Journal of Behavioral Sciences*, *9*(2), 105-130.

Byrd, T., Peterson, S., Chavez, R., & Heckert, A. (2004). Cervical cancer screening beliefs among young Hispanic women. *Preventive Medicine*, *38*(2), 192-197.

Cabassa, L. J. (2003). Measuring acculturation: Where we are and where we need to go. *Hispanic Journal of Behavioral Sciences, 25*, 127-146.

Cachelin, F., Monreal, T., & Juarez, L. (2006). Body image and size perceptions of Mexican American women. *Body Image*, *3*(1), 67-75.

Carrera, PM., Gao, X., & Tucker, KL. (2007). A study of dietary patterns in the Mexican-American population and their association with obesity. *Journal of the American Dietetic Association, 107*(10), 1735-1742.

CDC - National Center for Chronic Disease Prevention and Health Promotion. (2011a). *Healthy weight – it's not a diet, it's a lifestyle.* Atlanta, GA: CDC - National Center for Chronic Disease Prevention and Health Promotion. Retrieved from: http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html on January 15th, 2011.

CDC – The Centers for Disease Control and Prevention (CDC). (2004). Health disparities experienced by Hispanics - United States. *MMWR Morbidity and Mortality Weekly Report, 53*(40), 935-937.

CDC – The Centers for Disease Control and Prevention (CDC). (2009a). 2007 *Behavioral risk factor surveillance system survey questionnaire*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Retrieved from: http://www.cdc.gov/brfss/questionnaires/pdf-ques/2007brfss.pdf

CDC - The Centers for Disease Control and Prevention. (2009b). *MMWR Morbidity and Mortality Weekly Report, 58*(27), 740-744.

CDC - The Centers for Disease Control and Prevention. (2011b). *Prevalence of diabetes among Hispanics in six U.S. geographic locations*. Retrieved on January 2011 from: http://www.cdc.gov/diabetes/pubs/pdf/hispanic.pdf

CDC – The Centers for Disease Control and Prevention. (2010). *Hispanic/Latino profile.* Atlanta, GA: The Centers for Disease Control and Prevention. Retrieved from: http://www.cdc.gov/nchs/data/hus/hus10.pdf#026

Ceballos, M., & Palloni, A. (2010). Maternal and infant health of Mexican immigrants in the USA: The effects of acculturation, duration, and selective return migration. *Ethnicity and Health*, *15*(4), 377-396.

Chavez-Martinez, A., Cason, KL., Mayo, R., Nieto-Montenegro, S., Williams, JE., et al. (2010). Assessment of predisposing, enabling and reinforcing factors toward food choices and healthy eating among Hispanics in South Carolina. *Topics in Clinical Nutrition, 25*(1), 47 – 59.

Chen, PH., Rovi, S., Vega, M., & Jacobs, A. (2009). Relation of domestic violence to health status among Hispanic women. *Journal of Health Care for the Poor and Underserved*, *20*(2), 569-582.

Child, I .L. (1970). *Italian or American? The second generation in conflict*. New York, NY.: Russell & Russell.

Chiriboga, D. (2004). Some thoughts on the measurement of acculturation among Mexican American elders. *Hispanic Journal of Behavioral Sciences, 26*(3), 274-292.

Choi, BK., Schnall, PL., Yang, H., Dobson, M., Landsbergis, P., et al. (2010). Sedentary work, low physical job demand, and obesity in US workers. *American Journal of*

Industrial Medicine, *53*(11), 1088-1101. Retrieved at: http://midus.wisc.edu/findings/pdfs/840.pdf

Chong, N., & Baez, F. (2005). *Latino culture*. Yarmouth, ME: Intercultural Press.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* 2nd Ed. Hilsdale, NJ: Erlbaum.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. 3rd Ed. Mahwah, NJ: Erlbaum.

Cohen, J., Cohen, P., West, S., & Aiken, L. (1983). *Applied multiple regression/correlation analysis for the Behavioral Sciences*. 2nd Ed. Hilsdale, NJ: Erlbaum.

Coleman-Jensen, A., Nord, M., Andrews, M., & Carlson, M. (2011). Household food security in the United States in 2010. ERR-125, U.S. Dept. of Agriculture, *Economic Research Service*. September 2011.

Comas-Diaz, L. (1997). *Mental health needs of Latinos with professional status.* In. J. G. Garcia & M.C. Zea (Eds.), *Psychological interventions and research with Latino populations* (pp. 142-165). Needham Heights, MA: Allyn & Bacon.

Committee to Review the WIC Food Packages Food and Nutrition Board. (2006). *WIC food packages: Time for a change*. Washington, DC: Institute of Medicine of the National Academies.

Costigan, CL., & Su, TF. (2004). Orthogonal versus linear models of acculturation among immigrant Chinese Canadians: A comparison of mothers, fathers, and children. *International Journal of Behavioral Development, 28*: 518.

Cuellar, I., Arnold, B., & Maldonado, R. (1995). Acculturation rating scale for Mexican Americans-II: A revision of the original ARSMA scale. *Hispanic Journal of Behavioral Sciences*, *17*(3), 275-304.

Cuellar, I., Harris, L. & Jasso, R. (1980). An acculturation scale for Mexican American normal and clinical populations. *Hispanic Journal of Behavioral Sciences*, *2*(3), 199-217.

Cunningham, P., Banker, M., Artiga, S., & Tolbert, J. (2006). *Health coverage and access to care for Hispanics* in *"New growth communities" and "Major Hispanic centers"*. Kaiser Commission on Medicaid and the Uninsured. Retrieved online from http://www.kff.org/uninsured/upload/7551.pdf on December 2008.

Dana, RH. (Editor). (2000). *Handbook of cross-cultural and multicultural personality assessment*. In *Personality and clinical psychology Series*. Marwah, NJ: Lawrence Erlbaum Associates, Inc.

Dao, TK., Teten, AL., & Nguyen, Q. (2011). Linear and orthogonal models of acculturation and its relations to cultural variables: An examination of the Suinn-Lew Asian Self-Identity Acculturation Scale (SL-ASIA*). International Journal of Intercultural Relations, 35*; 61–68.

Davila, M., McFall, S., & Cheng, D. (2009). Acculturation and depressive symptoms among pregnant and postpartum Latinas. *Maternal and Child Health Journal*, *13*(3): 318-325.

Derose, KP., Escarce, JJ., & Lurie, N. (2007). Immigrants and Health Care: Sources Of Vulnerability. *Health Affairs, 26*(5), 1258–1268.

Dixon, D., Saul, J., & Peters, M. (2010). Psychosocial correlates of HIV sexual protective behavior among Puerto Rican women residing in the Bronx, New York. *Health Care for Women International*, *31*(3), 274-293.

Dixon, LB., Sundquist, J., & Winkleby, M. (2000). Differences in energy, nutrient, and food intakes in a US sample of Mexican-American women and men: Findings from the third national health and nutrition examination survey, 1988–1994. *American Journal of Epidemiology*, *152*(6), 548–557.

Elder, JP., Ayala, GX., Campbell, NR., Arredondo, EM., Slymen, DJ., et al. (2006). Long-term effects of a communication intervention for Spanish-dominant Latinas. *American Journal of Preventative Medicine, 31*, 159–166.

Espinosa de Los Monteros, K., Gallo, L., Elder, P., & Talavera, G. (2008). Individual and area-based indicators of acculturation and the metabolic syndrome among low-income Mexican American women living in a border region. *American Journal of Public Health*, *98*(11), 1979-1986.

Evenson, K., Sarmiento, O., & Ayala, G. (2004). Acculturation and physical activity among North Carolina Latina immigrants. *Social Science and Medicine*, *59*(12), 2509-2522.

Evenson, K., Sarmiento, O., Tawney, K., Macon, L., & Ammerman, A. (2003). Personal, social, and environmental correlates of physical activity in North Carolina Latina immigrants. *American Journal of Preventive Medicine*, *25*(3, Supplement 1), 77-85.

Fay, MP., & Proschan, MA. (2010). Wilcoxon-Mann-Whitney or t-test? On assumptions for hypothesis tests and multiple interpretations of decision rules. *Statistics Surveys, 10*(4), 1–39.

Fernandez, M., Diamond, P., Rakowski, W., Gonzalez, A., Tortolero-Luna, G., et al. (2009a). Development and validation of a cervical cancer screening self-efficacy scale for low-income Mexican American women. *Cancer Epidemiology Biomarkers and Prevention*, *18*(3), 866-875.

Fernandez, MA., McCurdy, SA., Arvey, SR., Tyson, SK., Morales-Campos, D., et al. (2009b). HPV knowledge, attitudes, and cultural beliefs among Hispanic men and women living on the Texas-Mexico border. *Ethnicity and Health, 14*(6), 607–624.

Fitzgerald, N., Damio, G., Segura-Perez, S., & Perez-Escamilla, R. (2008). Nutrition knowledge, food label use, and food intake patterns among Latinas with and without type 2 diabetes. *Journal of the American Dietetic Association*, *108*(6), 960-967.

Fitzgibbon, M., Gapstur, S., & Knight, S. (2003). Mujeres felices por ser saludables: a breast cancer risk reduction program for Latino women. *Preventive Medicine*, *36*(5), 536-546.

Flegal, K., Carroll, M., Kit, B. & Ogden, C. (2012). Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *Journal of the American Medical Association, 307*(5), 491-497.

Flegal, K., Carroll, M., Ogden, C., & Curtin, L. (2010). Prevalence and trends in obesity among US adults, 1999–2008. *Journal of the American Medical Association*, *303*(3), 235–241.

Flegal, KM., Carroll, MD., Kuczmarski, RJ., & Johnson, CL. (1988). Overweight and obesity in the United States: prevalence and trends, 1960-1994. *International Journal of Obesity and Related Metabolic Disorders, 22*(1), 39-47.

Garcés, I., Scarinci, I., & Harrison, L. (2006). An examination of sociocultural factors associated with health and health care seeking among Latina immigrants. *Journal of Immigrant and Minority Health, 8*(4), 377.

Garcia, L., Hurwitz, E., & Kraus, J. (2005). Acculturation and reported intimate partner violence among Latinas in Los Angeles. *Journal of Interpersonal Violence*, *20*(5), 569-590.

Garrard, J. (2007). *Health sciences literature review made easy: The matrix method.* Sudbury, MA: Jones & Bartlett Publishers, Inc.

Garrison, E., Roy, I., Azar, V. (1999). Responding to the mental health needs of Latino children and families through school-based services. *Clinical Psychology Review, 19*, 199-219.

Gastwirth, JL., Gel, YR. & Miao, W. (2009). The Impact of Levene's Test of Equality of Variances on Statistical Theory and Practice. *Statistical Science*, *24*(3), 343-360.

Gelman, C. (2004). Empirically-based principles for culturally competent practice with Latinos. *Journal of Ethnic & Cultural Diversity, 13*(1), 83-108.

Ghaddar, S., Brown, CJ., Pagán, JA., & Díaz, V. (2010). Acculturation and healthy lifestyle habits among Hispanics in United States-Mexico border communities. *Revista Panamericana de Salud Publica, 28*(3), 190-197.

Gloria, A. M., Ruiz, E. L., Castillo, E. M. (2003). *Counseling and psychotherapy with Latino and Latina clients*. In T. B. Smith (Ed.), *Affirming diversity in counseling and psychology* (pp. 167-189). Boston, MA: Pearson.

Gordon, MM. (1964). *Assimilation in American life: The role of race, religion, and natural origin*, London, UK: Oxford University Press.

Graves, K., Huerta, E., Cullen, J., Kaufman, E., Sheppard, V., et al. (2008). Perceived risk of breast cancer among Latinas attending community clinics: Risk comprehension and relationship with mammography adherence. *Cancer Causes and Control*, *19*(10), 1373-1382.

Griffiths, C., & Kuppermann, M. (2008). Perceptions of prenatal testing for birth defects among rural Latinas. *Maternal and Child Health Journal, 12*(1), 34-42.

Grimm KA, & Blanck HM. (2011). Survey language preference as a predictor of meeting fruit and vegetable objectives among Hispanic adults in the United States: Behavioral risk factor surveillance system 2009. *Preventing Chronic Disease, 8*(6) http://www.cdc.gov/pcd/issues/2011/nov/11_0091.htm. Accessed [10/20/2011].

Guenther, P.M., Reedy, J., & Krebs-Smith, S.M. (2008a). Development of the Healthy Eating Index-2005. *Journal of the American Dietetic Association*, *108*, 1886-1901.

Guenther, P.M., Reedy, J., Krebs-Smith, S.M., & Reeve, B.B. (2008b). Evaluation of the Healthy Eating Index-2005, *Journal of the American Dietetic Association, 108*, 1854-1864.

Guenther, P.M., Reedy, J., Krebs-Smith, S.M., Reeve, B.B., & Basiotis, P.P. (2007). *Development and evaluation of the healthy eating index-2005: Technical report.* Center for Nutrition Policy and Promotion. Washington, DC: U.S. Department of Agriculture. Available at http://www.cnpp.usda.gov/HealthyEatingIndex.htm.

Gutierrez, L, Yeakley, A., & Ortega, R. (2000). Educating students for social work with Latinos: Issues for the new millennium. *Journal of Social Work Education, 36*, 541-557.

Harley, K. and B. Eskenazi (2006).Time in the United States, social support and health behaviors during pregnancy among women of Mexican descent. *Social Science and Medicine*, *62*(12), 3048-3061.

Haskins, A., Bertone-Johnson, E., Pekow, P., Carbone, E., & Chasan-Taber, L. (2010). Correlates of smoking cessation at pregnancy onset among Hispanic women in Massachusetts. *American Journal of Health Promotion*, *25*(2), 100-108.

Haviland, AM., Elliott, MN., Hambarsoomian, K., & Lurie, N. (2011). Immunization disparities by Hispanic ethnicity and language preference. *Archives of Internal Medicine*, *171*(2), 158-165.

Heilemann, M., Frutos, L., Lee, K., & Kury, F. (2004). Protective strength factors, resources, and risks in relation to depressive symptoms among childbearing women of Mexican descent. *Health Care Women International*, *25*(1), 88.

Heilemann, M., Lee, K., & Kury, F. (2005). Strength factors among women of Mexican descent. *Western Journal of Nursing Research*, *27*(8), 949-965.

Heilemann, M., Lee, K., Stitson, J., Koshar., & Goss, G. (2000). Acculturation and perinatal health outcomes among rural women of Mexican descent. *Research in Nursing and Health*, *23*(2), 118-125.

Herman, D., Harrison, G.G., Afifi, AA., & Jenks E. (2008). Effect of a targeted subsidy on intake of fruits and vegetable among low-income women in the special supplemental nutrition program for women, infants and children. *American Journal of Public Health*, *98*(1), 98-105.

Hessol, N., Missett, B., & Fuentes-Afflick, E. (2004). Lower agreement on behavioral factors than on medical conditions in self-reported data among pregnant Latina women. *Archives of Medical Research*, *35*(3), 241-245.

Hochberg, Y. (1988). A sharper Bonferroni Procedure for Multiple Tests of Significance. *Biometrika, 75*(4), 800-802.

Hollander, M., & Wolfe, DA. (1999). *Non-parametric statistical methods*, 2nd Ed. New York, NY: Wiley.

Hosmer, DW. & Lemeshow, S. (2000). *Applied logistic regression*. New York, NY: Willey.

Howell, D. (2007). *The analysis of missing data*. Outhwaite, W. & Turner S (Eds.) in *Handbook of social science methodology*. London, UK: Sage Publications.

Hunt, L., Schneider, S., & Comer, B. (2004). Should acculturation be a variable in health research? A critical review of research on US Hispanics. *Social Science and Medicine*, *59*, 973-986.

Institute of Medicine (2006). Committee to Review the WIC Food Packages Food and Nutrition Board. *WIC food packages: Time for a change*. Washington, DC: Institute of Medicine of the National Academies.

Institute of Medicine (2007). *Unequal treatment: Confronting racial and ethnic disparities in health care*. Smedley, BD., Stith, AY. & Nelson, AR. (Eds.). Washington, DC: Institute of Medicine of the National Academies.

Jackson, S. (2008). *Research methods: A modular approach*. Belmont, CA: Thompson Wadsworth.

Jesse, D., Davis, A., Pokorny, N. (2004). High-Achieving Middle Schools for Latino Students in Poverty. *Journal of Education for Students Placed at Risk, 9*(1), 23-45.

Johnston, R. (1963). A New Approach to the Meaning of Assimilation, *Human Relations*, *16*(3), 295-298.

Jurkowski, J., Mosquera, M., & Ramos, B. (2010). Selected cultural factors associated with physical activity among Latino women. *Women's Health Issues*, *20*(3), 219-226.

Kaplan, M., Huget, N., Newsom, J., & McFarland, B. (2004). The association between length of residence and obesity among Hispanic immigrants. *American Journal of Preventive Medicine*, *27*(4), 323-326.

Kasirye, O., Walsh, J., Romano, P., Beckett, L., Garcia, J., et al. (2005). Acculturation and its association with health-risk behaviors in a rural Latina population. *Ethnicity and Disease*, *15*(4), 733-739.

Kepka, D., Coronado, G., Rodriguez, H., & Thompson, B. (2010). Acculturation and HPV infection among Latinas in the United States. *Preventive Medicine*, *51*(2), 182-184.

King, GA., Fitzhugh, EC., Bassett, DR., McLaughlin, JE., Strath, SJ, et al. (2001). Relationship of leisure-time physical activity and occupational activity to the prevalence of obesity. *International Journal of Obesity and Related Metabolic Disorders, 25*, 606–612.

Kobetz, E., Kornfeld, J., Vanderpool, R., Rutte, L., Parekh, N., et al. (2010). Knowledge of HPV among United States Hispanic women: Opportunities and challenges for cancer prevention. *Journal of Health Communication*, *15*(Suppl 3), 3-29.

Kuo, WH., Wilson, T., Holman, S., Fuentes-Afflick, E., O'Sullivan, M., et al. (2004). Depressive symptoms in the immediate postpartum period among Hispanic women in three U.S. cities. *Journal of Immigrant Health*, *6*(4), 145-153.

Lagos, V., Perez, M., Ricker, C., Blazer, K., Santiago, N., et al. (2008). Social-cognitive aspects of underserved Latinas preparing to undergo genetic cancer risk assessment for hereditary breast and ovarian cancer. *Psycho-Oncology*, *17*(8), 774-782.

Lara, M., Gamboa, C., Kahramanian, I., Morales, LS., & Hayes Bautista, D. (2005). Acculturation and Latino health in the United States: A review of the literature and its sociopolitical context. *Annual Review of Public Health, 26*, 367–397.

Laroche, M., Chankon, K., Hui, M., & Tomiuk, MA. (1997). A multidimensional perspective on acculturation and its relative impact on consumption of convenience foods. *Journal of International Consumer Marketing, 10*(1), 33-56.

Lehmann, EL. (1975). *Nonparametrics: Statistical methods based on ranks*. San Francisco, CA: Holden-Day, Inc.

Lerman, D., Maldonado, R., & Luna, D. (2010). A theory-based measure of acculturation: The shortened cultural life style inventory. *Journal of Business Research*; *62*(4), 399-406.

Levine, E.S., & Padilla, A.M. (1980). *Crossing cultures in therapy: Pluralistic counseling for the Hispanic.* Belmont, CA.: Wadsworth.

Lewin, K. (1948). *Resolving social conflicts*. New York, NY: Harper & Row.

Leybas-Amedia, V., Nuño, T., & Garcia, F. (2005). Effect of acculturation and income on Hispanic women's health. *Journal of Health Care for the Poor and Underserved*, *16*(4, Suppl. A), 128-141.

Link, MW., Mokdad, AH., Stackhouse, HF., & Flowers, NT. (2006). Race, ethnicity, and linguistic isolation as determinants of participation in public health surveillance surveys. *Preventing Chronic Disease*, *3*(1), 1-12. Retrieved from: http://www.cdc.gov/pcd/issues/2006/jan/05_0055.htm.

Lopez, O., Haigh, C., Burney, S. (2004). Relationship between hardiness and perceived stress in two generations of Latin American migrants. *Australian Psychologist, 39* (3), 238-243.

Lopez, VA., & Castro, FG. (2006). Participation and program outcomes in a church-based cancer prevention program for Hispanic women. *Journal of Community Health*, *31*(4), 343-362.

Lora, K., Lewis, N., Eskridge, K., Stanek-Krogstand, K., & Ritter-Gooder, P. (2010). Validity and reliability of an omega-3 fatty acid food frequency questionnaire for first-generation Midwestern Latinas. *Nutrition Research*, *30*(8), 550-557.

Lovasi, GS., Hutson, MA., Guerra, M., & Neckerman, KM. (2009). Built Environments and obesity in disadvantaged populations. *Epidemiologic Reviews, 31*, 7–20.

Mack, K., Pavao, J., Tabnak, F., Knutson, K., & Kimerling, R. (2009). Adherence to recent screening mammography among Latinas: Findings from the California women's health survey. *Journal of Women's Health*, *18*(3), 347-354.

Magaña, A., Clarck, N. (1995). Examining a Paradox: Does Religiosity Contribute to Positive Birth Outcomes in Mexican American Populations? *Health Education Quarterly, 22*(1) 96-109.

Maloney, CB. (Chair). (2010). *Understanding the economy unemployment in the Hispanic community*. Washington DC: US Congress' Joint Economic Committee.

Marin, G. & Marin, B. (1991). *Research with Hispanic populations*. Newbury Park, CA: Sage eds.

Marin, G. (1992*). Issues in the measurement of acculturation of Hispanics.* In K. F. Geisinger (Ed.), *Psychological testing of Hispanics* (pp. 235-251). Washington, DC: American Psychological Association.

Marin, G., & Gamba, R. J. (1996). A new measurement of acculturation for Hispanics: The bidimensional acculturation scale for Hispanics. *Hispanic Journal of Behavioral Sciences*, *18*, 297–316.

Marin, G., & Triandis, H.C. (1985). *Allocentrism as an important characteristic of the behavior of Latin Americans and Hispanics*. In R. Diaz-Guerrero (Ed.), *Cross-cultural and national studies in social psychology* (pp.85-104). Amsterdam: North Holland.

Marin, G., Perez-Stable, E. & Marin, B. (1989). Cigarrette smoking among San Francisco Hispanics: The role of acculturation and gender. *American Journal of Public Health*, *79*(2), 196-198.

Marin, G., Sabogal, F., Marin, B., Otero-Sabogal, R., & Perez-Stable, E. (1987). Development of a short acculturation scale for Hispanics. *Hispanic Journal of Behavioral Sciences*, *9*, 183-205.

Martinez-Schallmoser, L., Telleen, S., & Macmullen, N. (2003). The effect of social support and acculturation on postpartum depression in Mexican American women. *Journal of Transcultural Nursing*, *14*(4), 329-338.

Mason, J., Gillenwater, K., Pugh, R., Kenefik, E., Collins, G., et al. (2000). *Practical analysis of nutritional data (PANDA)*. Chapter 2, [Online], retrieved from : http://www.tulane.edu/~panda2/Analysis2/ahome.html.

McCarthy, M. C., Ruiz, E., Gale, B., Karam, C., & Moore, N. (2004). The meaning of health: Perspectives of Anglo and Latino older women. *Health Care for Women International, 25*(10), 950-969.

McCuster, M., Sanchez, E., Murdock, S., Hoque, N., & Huang, P. (2004). *The Burden of overweight and obesity in Texas, 2000-2040*. Austin, TX: Texas Department of State Health Services. Retrieved from : http://www.publichealthgrandrounds.unc.edu/catch/handout_txCost_Obesity_Report.pdf

McDowell, M., Fryar, C., Ogden, C., & Flegal, K. (2008). *Anthropometric reference data for children and adults: United States, 2003–2006.* National Health Statistics Report, 10. Hyattsvile, MD: National Center for Health Statistics.

McKyer, ELJ., Vaughan, K., Murano, PS., Girimaji, A., Baxter, S., et al. (2010). Development and testing of Texas WIC's Food and Nutrition Questionnaire. *Texas Public Health Journal, 63*, 46-49.

Menard, S. (2002). *Applied logistic regression analysis* (*Quantitative applications in the social sciences*), 2nd Ed. Thousand Oaks, CA: Sage Eds.

Miranda, A. O., & Matheny, K. B. (2000). Socio-psychological predictors of acculturative stress among Latino adults. *Journal of Mental Health Counseling, 22*(4), 306-317.

Miranda, A.O., Bilot, J.M., Peluso, P.R., Berman, K., Van Meek, L.G. (2006). Latino Families: The Relevance of the Connection among Acculturation, Family Dynamics, and Health for Family Counseling Research and Practice. *The Family Journal: Counseling and Therapy for Couples and Families, 14*(3), 268-273.

Molina, C.W., & Aguirre-Molina, M.J. (1994). *The influence of culture, class, and environment on health care.* In C. W. Molina & M. J. Aguirre-Molina (Eds.), *Latino health in the US: A growing challenge*. Washington, DC: American Public Health Association.

Murtaugh, MA., Herrick, JS., Sweeney, C., Baumgartner, KB., Giuliano, AR., et al. (2007). Diet composition and risk of overweight and obesity in women living in

the southwestern Unites States. *Journal of the American Dietetic Association, 107*(8), 1311-1321.

Negy, C., & Woods, D. (1992). The importance of acculturation in understanding research with Hispanic-Americans. *Hispanic Journal of Behavioral Sciences*, *14*, 224-247.

Neuhouser, M., Thompson, B., Coronado, G., & Solomon, C. (2004). Diet and food insufficiency among Hispanic youths: acculturation and socioeconomic factors in the third National Health and Nutrition Examination Survey. *Journal of the American Dietetic Association, 104*, 51–57.

Newman, D. (2003). Longitudinal modeling with randomly and systematically missing data: A simulation of ad hoc, maximum likelihood, and multiple imputation techniques. *Organizational Research Methods*, *6*(3), 328- 362.

Nguyen, AD., & Benet-Martínez, V. (2007). Biculturalism unpacked: Components, measurement, individual differences, and outcomes. *Social and Personality Psychology Compass, 1*(1), 101-114.

Nguyen, HH., & von Eye, A. (2002). The Acculturation Scale for Vietnamese Adolescents (ASVA): A bidimensional perspective, *International Journal of Behavioral Development*; *26*, 202-213.

Noether, GE. (1991). *Introduction to statistics: The nonparametric way*. New York, NY: Springer-Verlag.

Nord, M. (2009). *Food insecurity in households with children: Prevalence, severity, and household characteristics*. EIB-56. Economic Research Service. Washington, DC: U.S. Dept. of Agriculture.

Norman, S., Castro, C., Albright, C., & King, A. (2004). Comparing acculturation models in evaluating dietary habits among low-income Hispanic women. *Ethnicity and Disease*, *14*(3), 399-404.

Oetting, E., & Beauvais, F. (1990 & 1991). Orthogonal cultural identification theory: The cultural identification of minority adolescents. *Substance Use & Misuse*, *25* (s5-s6), 655-685.

Ogden CL, Flegal KM., Carroll, MD., & Johnson, CL. (2002). Prevalence and trends in overweight among U.S. children and adolescents, 1999-2000. *Journal of the American Medical Association, 288*, 1728-1732.

Ogden, C., Carroll, M., Kit, B., & Flegal, K. (2012a). Prevalence of Obesity and Trends in Body Mass Index Among US Children and Adolescents, 1999-2010. *Journal of the American Medical Association, 307*(5), 483-490.

Ogden, CL., Carroll, MD., Curtin, LR., McDowell, MA., Tabak, CJ., et al. (2006). Prevalence of Overweight and Obesity in the United States, 1999-2004. *Journal of the American Medical Association, 295*(13), 1549-1555.

Ogden, CL., Carroll, MD., Kit, BK., & Flegal, KM. (2012b). *Prevalence of obesity in the United States, 2009–2010.* In *NCHS data brief, no 82*. Hyattsville, MD: National Center for Health Statistics.

Ohbuchi, K. I., Fukushima, O., Tedeschi, J. T. (1999). Cultural values in conflict management: Goal orientation, goal attainment, and tactical decision. *Journal of Cross-Cultural Psychology, 30*, 51-71.

Olmedo, E., & Padilla, A. (1978). Empirical and construct validation of a measure of acculturation for Mexican Americans. *Journal of Social Psychology*, *105*(2), 179-182.

Osborne, J. (Ed.) (2008). *Best practices in quantitative methods*. Thousand Oaks, CA: Sage Eds.

Peragallo, N. (1996). Latino Women and AIDS Risk. *Public Health Nursing 13*(3); 217–222.

Power C, & Moynihan C. (1988). Social class and changes in weight-for-height between childhood and early adulthood. *International Journal Obesity*, *12*(5), 445-453.

Purnell, L. D., & Paulanka, B. J. (2003). *Transcultural health care: A culturally competent approach* (2nd ed.). Philadelphia, PA: F. A. Davis.

Quiñones Mayo, Y. & Resnic, RP. (1996). The Impact of machismo on Hispanic women. *Affilia, 11*, 257-277.

Rodriguez, N., Mira, CB., Paez, ND., & Myers, HF. (2007). Exploring the complexities of familism and acculturation: Central constructs for people of Mexican origin. *American Journal of Community Psychology, 39,* 61–77.

Rojas-Guyler, L., Ellis, N., & Sanders, S. (2005). Acculturation, health protective sexual communication, and HIV/AIDS risk behavior among Hispanic women in a large midwestern city. *Health Education Behavior*, *32*(6), 767-779.

Rudmin, F. (2003). Critical history of the acculturation psychology of assimilation, separation, integration, and marginalization. *Review of General Psychology*, *7*(1), 3-37.

Ryder, AG., Alden, LE., & Paulhus, DH. (2000). Is Acculturation unidimensional or bidimensional? A head-to-head comparison in the prediction of personality, self-identity, and adjustment. *Journal of Personality and Social Psychology, 79*(1), 49-65.

Sabogal, F., Marin, G., Otero-Sabogal, R., Marin, B., & Perez-Stable, E. (1987). Hispanic familism and acculturation: What changes and what doesn't? *Hispanic Journal of Behavioral Sciences, 9*, 397-412.

Sanchez, M., Rice, E., Stein, J., Milburn, N., & Rotheram-Borus, M. (2010). Acculturation, coping styles, and health risk behaviors among HIV positive Latinas. *AIDS and Behavior*, *14*(2), 401-409.

Santiago-Rivera, A.L., Arredondo, P., & Gallardo-Cooper, M. (2002). *Counseling Latinos and la familia: A practical guide.* Thousand Oaks, CA: Sage.

Serdula, MK., Ivery, D., Coates, RJ., Freedman, DS., Williamson, DF., & Byers, T. (2003). Do obese children become obese adults? A review of the literature. *Preventive Medicine, 22*, 167-177.

Shah, M., Zhu, K., Wu, H., & Potter, J. (2006). Hispanic acculturation and utilization of cervical cancer screening in the US. *Preventive Medicine*, *42*(2), 146-149.

Shea, S., Stein, AD., Basch, CE., Freudenheim, J., Lantigua, R., et al. (1991). Independent associations of educational attainment and ethnicity with behavioral risk factors for cardiovascular disease. *American Journal of Epidemiology*, *134*(6), 567-582.

Siatkowski AA. (2007). Hispanic acculturation: a concept analysis. *Journal of Transcultural Nursing*, *18*(4), 316-323.

Siega-Riz, AM., Popkin, BM., & Carson, T. (2000). Differences in food patterns at breakfast by sociodemographic characteristics among a nationally representative sample of adults in the United States. *Preventive Medicine*, *30*, 415–424.

Singh, G., & Siahpush, M. (2002). Ethnic-immigrant differentials in health behaviors, morbidity, and cause-specific mortality in the United States: An analysis of two national data bases. *Human Biology*, *74*(1), 83–109.

Singh, GK., & Hiatt, RA. (2006). Trends and disparities in socioeconomic and behavioural characteristics, life expectancy, and cause-specific mortality of native-born and foreign-born populations in the United States, 1979–2003. *International Journal of Epidemiology, 35*(4), 903-919.

Singh, GK., Siahpush, M., Hiatt, RA., & Timsina, LR. (2011). Dramatic Increases in Obesity and Overweight Prevalence and Body Mass Index among Ethnic-

immigrant and Social Class Groups in the United States, 1976–2008. *Journal of Community Health, 36*(1), 94-110.

SPSS Inc. (2010). *PASW® Statistics 18 Core System User's Guide*. Chicago, IL: SPSS.

Suinn, R. M., Ahuna, C., Khoo, G. (1992). The Suinn-Lew Asian Self-Identity Acculturation Scale: Concurrent and factorial validation. *Educational & Psychological Measurement, 52*(4): 1041-1046.

Sussner, K., Jandorf, L., Thompson, H., & Valdimarsdottil, H. (2010). Interest and beliefs about BRCA genetic counseling among at-risk Latinas in New York City. *Journal of Genetic Counseling*, *19*(3), 255-268.

Sussner, K., Thompson, H., Valdimarsdottil, H., Redd, W., & Jandorf, L. (2009). Acculturation and familiarity with attitudes towards and beliefs about genetic testing for cancer risk within Latinas in East Harlem, New York City. *Journal of Genetic Counseling*, *18*(1), 60-71.

Tann, S. (2005). Implications for Quality of Life Research in Latino Populations. *Journal of Transcultural Nursing, 16*(2), 136-141.

Teske, R. & Nelson, B. (1974). Acculturation and assimilation: a clarification, *American Ethnologist*, *1*, 351-367.

Texas State Data Center, Office of the State Demographer. (2011). *Population estimates and projections program*. Austin, TX: Institute for Demographic and Socioeconomic Research. Retrieved from: http://txsdc.utsa.edu/Data/TPEPP/Projections/2008/Index.aspx

Thompson, B. (2007). Effect sizes, confidence intervals, and confidence intervals for effect sizes. *Psychology in the Schools, 44*, 423-432.

Thompson, B. (2008a). *Foundations of behavioral statistics*: *An insight-based approach*, 1st Ed. New York, NY: The Guilford Press.

Thompson, B. (2008b). *Computing and interpreting effect sizes, confidence intervals, and confidence intervals for effect sizes*. In J. Osborne (Ed.), *Best practices in quantitative methods* (pp. 246-262). Newbury Park, CA: Sage

Torres, J.B. (2000). Communication Patterns and Direct Social Work Practice with Latinos in the U.S. *Journal of Human Behavior in the Social Environment, 3*(2), 23-42.

Triandis, H. C., Suh, E. M. (2002). Cultural influences on personality. *Annual Review of Psychology, 53*, 133-160.

Triandis, H., Marin, G., Lisanksy, J., & Betancourt, H. (1984). Simpatia as a Cultural Script of Hispanics. *Journal of Personality and Social Psychology, 47*(6) 1363-1375.

U.S Department of Commerce, US Census Bureau. (2004). *U.S. interim projections by age, sex, race, and Hispanic origin*. Washington, DC: US Department of Commerce, US Census Bureau. Retrieved from: http://www.census.gov/ipc/www/usinterimproj.

U.S Department of Commerce, US Census Bureau. (2006). *Hispanics in the United States.* Washington, DC: US Department of Commerce, US Census Bureau.

Retrieved from: http://www.census.gov/population/www/socdemo/hispanic/files/Internet_Hispanic_in_US_2006.pdf.

U.S Department of Commerce, US Census Bureau. (2011a). *Overview of race and Hispanic origin : 2010.* Washington, DC: US Department of Commerce, US Census Bureau. Retrieved from: http://www.census.gov/prod/cen2010/briefs/c2010br-02.pdf.

U.S Department of Commerce, US Census Bureau. (2011b). *Profile America facts for features. Hispanic heritage month 2011*. Washington, DC: US Department of Commerce, US Census Bureau. Retrieved from: http://www.census.gov/newsroom/releases/archives/facts_for_features_special_editions/cb11-ff18.html

U.S. Department of Health and Human Services, U.S. Department of Agriculture. (2005). *Dietary guidelines for Americans*. Washington, DC: U.S. Department of Health and Human Services, U.S. Department of Agriculture. Retrieved from: http://www.cnpp.usda.gov/Publications/DietaryGuidelines/2005/2005DGPolicyDocument.pdf.

U.S. Department of Health and Human Services, U.S. Department of Agriculture. (2010a). *Program data WIC program 2010*. Washington, DC: U.S. Department of Health and Human Services, U.S. Department of Agriculture. Retrieved from: http://www.fns.usda.gov/pd/wicmain.htm

U.S. Department of Health and Human Services, U.S. Department of Agriculture. (2010b). *Characteristics of supplemental nutrition assistance program households: Fiscal year 2010, supplemental nutrition assistance program data 2010*. Washington, DC: U.S. Department of Health and Human Services, U.S. Department of Agriculture. Retrieved from: http://www.fns.usda.gov/ora/MENU/Published/snap/FILES/Participation/2010Characteristics.pdf

U.S. Department of Health and Human Services, U.S. Department of Agriculture. (2008). *WIC Program total enrollment by region and state as of April 2008.* Washington, DC: U.S. Department of Health and Human Services, U.S. Department of Agriculture. Retrieved from: http://www.fns.usda.gov/wic/racial-ethnicdata/2008table4.htm

Uber Grosse, C. (2001). Mexican Managers' Perceptions of Cultural Competence. *Foreign Language Annals, 34*(4), 334-340.

US Department of Agriculture, US Food and Nutrition Service. Federal Register (2007). *Special supplemental nutrition program for women, infants and children (WIC): Revisions in the WIC food packages; interim rule*. Federal Register, 72, 234. Thursday, December 6, 2007 / Rules and Regulations. Retrieved from: http://www.fns.usda.gov/wic/regspublished/wicfoodpkginterimrulepdf.pdf

US Department of Agriculture, US Food and Nutrition Service. Federal Register. (2008). *Special supplemental nutrition program for women, infants and children (WIC):*

Revisions in the WIC food packages: Delay of implementation date. Federal Register, 73 (52), Monday, March 17, 2008 / Rules and Regulations. Retrieved from: http://www.fns.usda.gov/wic/regspublished/foodpkgimplemdelay.pdf

Vadaparampil, S., McIntyre, J., & Quinn, G. (2010). Awareness, perceptions, and provider recommendation related to genetic testing for hereditary breast cancer risk among at-risk Hispanic women: Similarities and variations by sub-ethnicity. *Journal of Genetic Counseling*, *19*(6), 618-629.

Vahratian, A. (2009). Prevalence of Overweight and Obesity Among Women of Childbearing Age: Results from the 2002 National Survey of Family Growth. *Maternal and Child Health Journal, 13*(2), 268-273.

Vazquez, C.I., Rosa, D. (1999). An Understanding of Abuse in the Hispanic Older Person: Assessment, Treatment, and Prevention. *Journal of Social Distress and the Homeless, 8(3)*, 193-206.

Vega, W., & Amaro, H. (1994). Latino outlook: Good health, uncertain prognosis. *Annual Review of Public Health*, *15*, 39-46.

Venkat, P., Masch, R., Ng, E., Cremer, M., Richman, S., et al. (2008). Knowledge and beliefs about contraception in urban Latina women. *Journal of Community Health*, *33*(5), 357-362.

Voorhees, C., & Young, D. (2003). Personal, social, and physical environmental correlates of physical activity levels in urban Latinas. *American Journal of Preventive Medicine*, *25*(3, Supp1), 61-68.

Wang, Y., & Beydoun, MA. (2007). The Obesity epidemic in the United States—Gender, age, socioeconomic, racial/ethnic, and geographic characteristics: A systematic review and meta-regression analysis. *Epidemiologic Reviews, 29*(1), 6-28.

Ward, C. & Kagitcibasi, C. (2010). Applied acculturation research: Working with, for and beyond communities. *International Journal of Intercultural Relations, 34*(2), 186-189.

Watts, L., Joseph, N., Velasquez, A., Gonzalez, M., Munro, E., et al. (2009). Understanding barriers to cervical cancer screening among Hispanic women. *American Journal of Obstetrics and Gynecology*, *201*(2), 199 e1-e8.

Wilbur, J., Chandler, P., & Dancy, B. (2003). Correlates of physical activity in urban Midwestern Latinas. *American Journal of Preventive Medicine*, *25*(3, Supp1), 69-76.

Wingo, P., Kulkarni, A., Borrud, L., McDonald, J., Villalobos, S., et al. (2009). Health disparities among Mexican American women aged 15-44 years: National Health and Nutrition Examination Survey, 1999-2004. *American Journal of Public Health*, 99(7), 1300-1307.

Wolin, K., Colangelo, L., Chiu, B., & Gapstur, S. (2009). Obesity and immigration among Latina women. *Journal of Immigrant and Minority Health*, *11*(5), 428-431.

World Health Organization (WHO). (1995). *Physical status: the use and interpretation of anthropometry. Report of a WHO expert committee.* WHO Technical Report Series 854. Geneva: World Health Organization.

World Health Organization (WHO). (2000). *Obesity: preventing and managing the global epidemic. Report of a WHO consultation.* WHO Technical Report Series 894. Geneva: World Health Organization.

Yamada, AM., Valle, R., Barrio, C., & Jeste, D. (2006). Selecting an Acculturation Measure for Use With Latino Older Adults. *Research on Aging*, *28*, 519-561.

Yeh, MC., Ickes, SB., Lowenstein, LM., Shuval, K., Ammermann, AS., et al. (2008). Understanding barriers and facilitators of fruit and vegetable consumption among a diverse multi-ethnic population in the USA. *Health Promotion International, 23*(1), 42-51.

Yeh, MC., Viladrich, A., Bruning, N., & Roye, C. (2009). Determinants of Latina obesity in the United States: The role of selective acculturation. *Journal of Transcultural Nursing, 20*(1), 105-115.

Zambrana, R. E., Silva-Palacios, V., & Powell, D. (1992). Parenting concerns, family support systems, and life problems in Mexican-origin women: A comparison by nativity. *Journal of Community Psychology, 20*, 276–288.

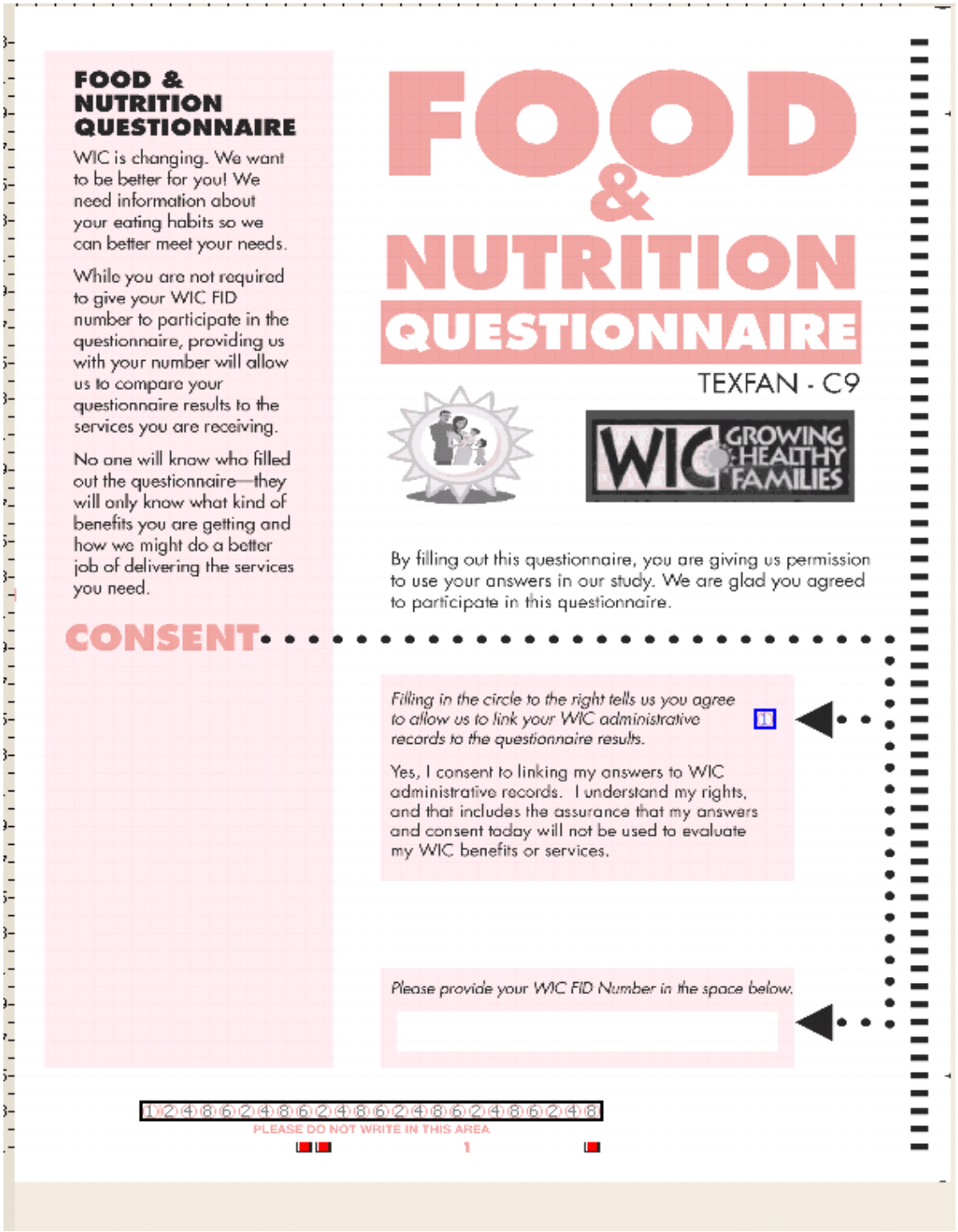
Zane, N., & Mak, W. (2003). *Major approaches to the measurement of acculturation among ethnic minority populations: A content analysis and an alternative empirical strategy.* In G. Marin, P. B. Organista, & K. Chun (Eds.) *Acculturation:*

Advances in theory, measurement, and applied research (pp. 39–60). Washington, DC: American Psychological Association.

Zhang, Q., & Wang, Y. (2004). Socioeconomic inequality of obesity in the United States: do gender, age, and ethnicity matter?, *Social Science & Medicine*; *58*, 1171–1180.

APPENDIX A

Texas food and nutrition questionnaire" (TEXFAN-Q)



FOOD & NUTRITION QUESTIONNAIRE

WIC is changing. We want to be better for you! We need information about your eating habits so we can better meet your needs.

While you are not required to give your WIC FID number to participate in the questionnaire, providing us with your number will allow us to compare your questionnaire results to the services you are receiving.

No one will know who filled out the questionnaire—they will only know what kind of benefits you are getting and how we might do a better job of delivering the services you need.

FOOD & NUTRITION QUESTIONNAIRE

TEXFAN - C9

WIC GROWING HEALTHY FAMILIES

By filling out this questionnaire, you are giving us permission to use your answers in our study. We are glad you agreed to participate in this questionnaire.

CONSENT

Filling in the circle to the right tells us you agree to allow us to link your WIC administrative records to the questionnaire results.

Yes, I consent to linking my answers to WIC administrative records. I understand my rights, and that includes the assurance that my answers and consent today will not be used to evaluate my WIC benefits or services.

Please provide your WIC FID Number in the space below.

PLEASE DO NOT WRITE IN THIS AREA

Appendix A – *Continued*

REMINDER!

Your answers to these questions will help Texas WIC improve programs and services to better meet our participants' needs. Please remember that your answers to these questions will NEVER be used to determine your WIC eligibility.

The questionnaire is divided into FOUR sections (Family, Adult, Infant, and Child). Complete the Family, Adult and the last two sections, if they apply.

FAMILY

Everyone fills out this section!

1. How many infants/children in YOUR household currently receive WIC benefits?

0 None Infants & Children 1 2 3 4 5 6 7 8 9 10 11 11 or more

2. Other than WIC, who helps YOUR FAMILY get food?
(Choose all that apply - you can choose more than one)

- 1 Food Stamps
- 1 Food Bank
- 1 Religious Organization, or Church, Synagogue or Mosque
- 1 Family
- 1 None
- 1 Other (please specify) _____

Please choose the best answer for each of the following statements:

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
3. I like the food choices offered by WIC.	1	2	3	4	5
4. I like the food amount offered by WIC.	1	2	3	4	5

5. How often in the past month did YOUR FAMILY eat tofu, if ever?

- 0 Never or Less Than 1 Per Month
- 1 1 Per Month
- 2 2-3 Per Month
- 3 1 Per Week
- 4 2 Per Week
- 5 3-4 Per Week
- 6 5-6 Per Week
- 7 2 or More Per Day

6. What type of beans do you *usually* buy for YOU and/or YOUR FAMILY?
(Choose one only)

- 0 Canned
- 1 Dried
- 2 **I do not** buy beans

YOU HAVE FINISHED THIS SECTION ABOUT YOUR FAMILY. THANK YOU!

THE NEXT SECTION IS ABOUT YOU.

Please continue to the next section.

Appendix A – *Continued*

ADULT

Everyone fills out this section!

7. Did YOU receive WIC foods in the past 30 days? ① Yes ② No

How often do YOU do each of the following?	NEVER OR LESS THAN ONCE PER WEEK	1 TO 3 TIMES PER WEEK	4 TO 6 TIMES PER WEEK	1 TIME PER DAY	2 TIMES PER DAY	3 TIMES PER DAY	4 OR MORE TIMES PER DAY
8. Drink 100% juices such as orange, apple, or tomato.	0	1	2	3	4	5	6
9. Drink artificially sweetened drinks such as diet cola, diet soda, or Crystal Light®.	0	1	2	3	4	5	6
10. Drink soy milk.	0	1	2	3	4	5	6
11. Drink sugar sweetened drinks such as Kool-Aid®, soda, cola, sports drinks, or sugar sweetened tea.	0	1	2	3	4	5	6
12. Eat fruit, NOT including juice.	0	1	2	3	4	5	6
13. Eat vegetables such as salad, carrots, or sweet potatoes, NOT including potatoes, French fries, or potato chips.	0	1	2	3	4	5	6
14. Eat French fries, fried potatoes, or potato chips.	0	1	2	3	4	5	6
15. Eat potatoes, NOT including French fries, fried potatoes, or potato chips.	0	1	2	3	4	5	6
16. Eat other vegetables, NOT including carrots, potatoes, or salad.	0	1	2	3	4	5	6

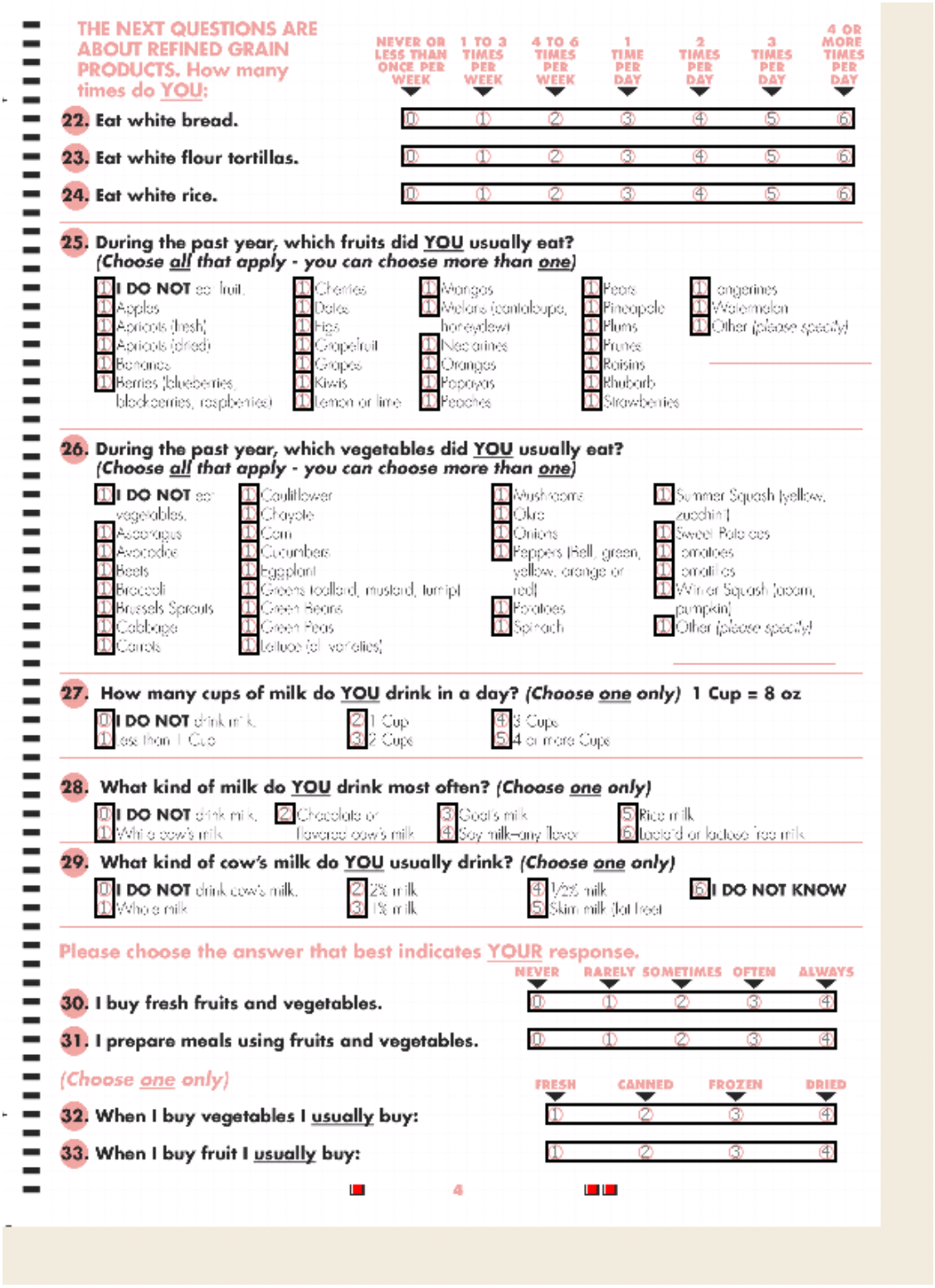
THE NEXT QUESTIONS ARE ABOUT WHOLE GRAIN PRODUCTS. How many times do YOU:	NEVER OR LESS THAN ONCE PER WEEK	1 TO 3 TIMES PER WEEK	4 TO 6 TIMES PER WEEK	1 TIME PER DAY	2 TIMES PER DAY	3 TIMES PER DAY	4 OR MORE TIMES PER DAY
17. Eat whole-wheat tortillas.	0	1	2	3	4	5	6
18. Eat corn tortillas.	0	1	2	3	4	5	6
19. Eat whole-wheat or whole grain bread.	0	1	2	3	4	5	6
20. Eat brown rice.	0	1	2	3	4	5	6
21. Eat oatmeal.	0	1	2	3	4	5	6

① ② ④ ⑧ ⑥ ② ④ ⑧ ⑥ ② ④ ⑧ ⑥ ② ④ ⑧ ⑥ ② ④ ⑧ ⑥ ② ④ ⑧

PLEASE DO NOT WRITE IN THIS AREA

3

Appendix A – *Continued*



THE NEXT QUESTIONS ARE ABOUT REFINED GRAIN PRODUCTS. How many times do YOU:

NEVER OR LESS THAN ONCE PER WEEK | 1 TO 3 TIMES PER WEEK | 4 TO 6 TIMES PER WEEK | 1 TIME PER DAY | 2 TIMES PER DAY | 3 TIMES PER DAY | 4 OR MORE TIMES PER DAY

22. Eat white bread. 0 1 2 3 4 5 6

23. Eat white flour tortillas. 0 1 2 3 4 5 6

24. Eat white rice. 0 1 2 3 4 5 6

25. During the past year, which fruits did YOU usually eat? *(Choose all that apply - you can choose more than one)*

- 1 I DO NOT eat fruit
- 1 Apples
- 1 Apricots (fresh)
- 1 Apricots (dried)
- 1 Bananas
- 1 Berries (blueberries, blackberries, raspberries)
- 1 Cherries
- 1 Dates
- 1 Figs
- 1 Grapefruit
- 1 Grapes
- 1 Kiwis
- 1 Lemon or lime
- 1 Mangos
- 1 Melons (cantaloupe, honeydew)
- 1 Nectarines
- 1 Oranges
- 1 Papayas
- 1 Peaches
- 1 Pears
- 1 Pineapple
- 1 Plums
- 1 Prunes
- 1 Raisins
- 1 Rhubarb
- 1 Strawberries
- 1 Tangerines
- 1 Watermelon
- 1 Other (please specify)

26. During the past year, which vegetables did YOU usually eat? *(Choose all that apply - you can choose more than one)*

- 1 I DO NOT eat vegetables.
- 1 Asparagus
- 1 Avocados
- 1 Beets
- 1 Broccoli
- 1 Brussels Sprouts
- 1 Cabbage
- 1 Carrots
- 1 Cauliflower
- 1 Chayote
- 1 Corn
- 1 Cucumbers
- 1 Eggplant
- 1 Greens (collard, mustard, turnip)
- 1 Green Beans
- 1 Green Peas
- 1 Lettuce (all varieties)
- 1 Mushrooms
- 1 Okra
- 1 Onions
- 1 Peppers (Bell, green, yellow, orange or red)
- 1 Potatoes
- 1 Spinach
- 1 Summer Squash (yellow, zucchini)
- 1 Sweet Potatoes
- 1 tomatoes
- 1 tomatillos
- 1 Winter Squash (acorn, pumpkin)
- 1 Other (please specify)

27. How many cups of milk do YOU drink in a day? *(Choose one only)* 1 Cup = 8 oz

- 0 I DO NOT drink milk
- 1 Less than 1 Cup
- 2 1 Cup
- 3 2 Cups
- 4 3 Cups
- 5 4 or more Cups

28. What kind of milk do YOU drink most often? *(Choose one only)*

- 0 I DO NOT drink milk
- 1 Whole cow's milk
- 2 Chocolate or flavored cow's milk
- 3 Goat's milk
- 4 Soy milk–any flavor
- 5 Rice milk
- 6 Lactaid or lactose free milk

29. What kind of cow's milk do YOU usually drink? *(Choose one only)*

- 0 I DO NOT drink cow's milk.
- 1 Whole milk
- 2 2% milk
- 3 1% milk
- 4 ½% milk
- 5 Skim milk (fat free)
- 6 I DO NOT KNOW

Please choose the answer that best indicates YOUR response.

NEVER | RARELY | SOMETIMES | OFTEN | ALWAYS

30. I buy fresh fruits and vegetables. 0 1 2 3 4

31. I prepare meals using fruits and vegetables. 0 1 2 3 4

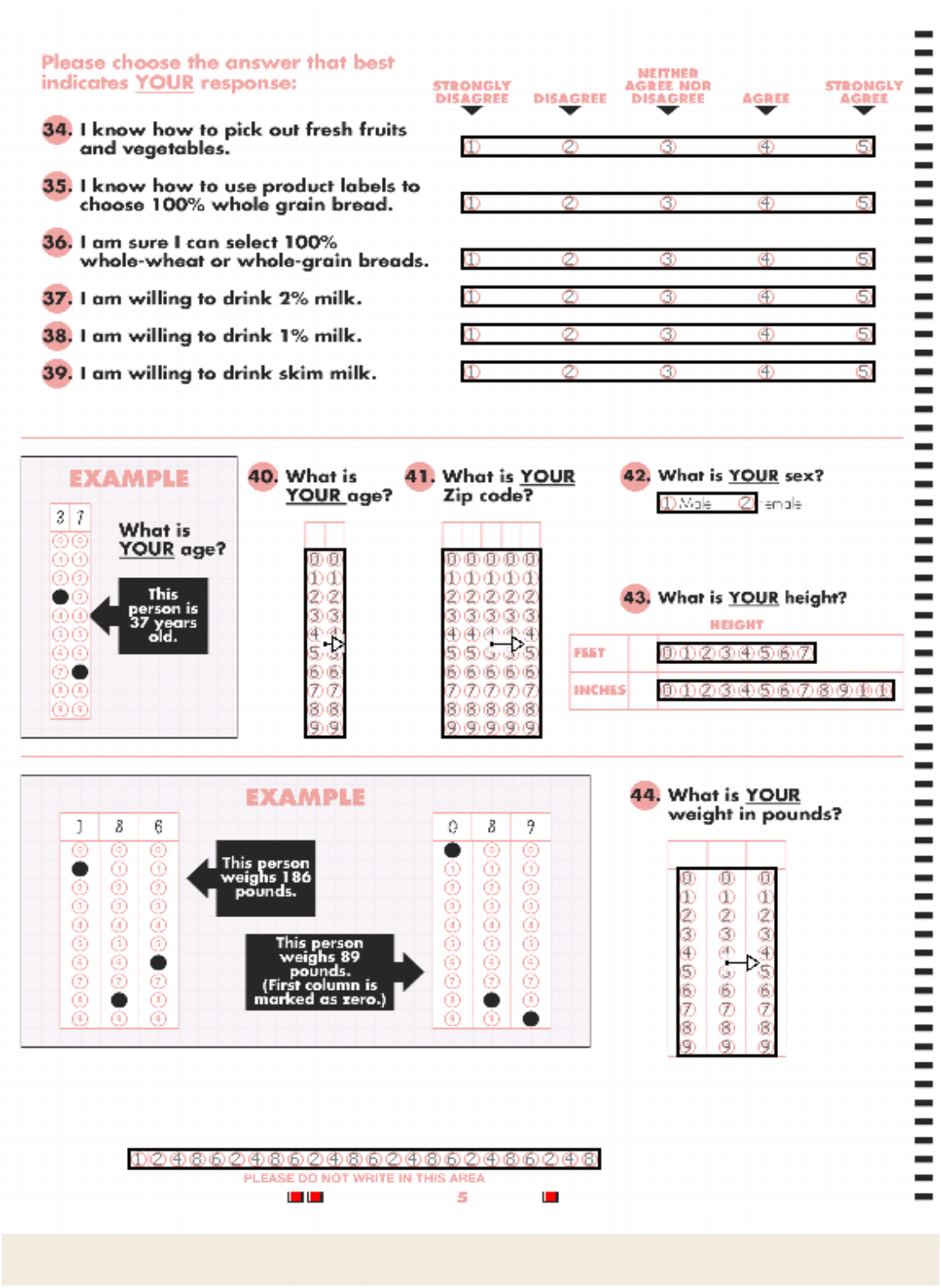
(Choose one only)

FRESH | CANNED | FROZEN | DRIED

32. When I buy vegetables I usually buy: 1 2 3 4

33. When I buy fruit I usually buy: 1 2 3 4

Appendix A – *Continued*



Appendix A – *Continued*

45. What language is spoken MOST OFTEN at home? *(Choose one only)*

0 English 1 Spanish and English 2 Spanish 3 Other *(please specify)* _____

46. What is YOUR race?
(Choose all that apply - you can choose more than one)

1 White, non-Hispanic
1 White, Hispanic
1 Black, non-Hispanic
1 Black, Hispanic
1 Native American, non-Hispanic
1 Native American, Hispanic
1 Pacific Islander, non-Hispanic
1 Pacific Islander, Hispanic
1 Asian, non-Hispanic
1 Asian, Hispanic
1 Do NOT want to answer
1 Other *(please specify)* _____

47. What is the highest level of education YOU have completed?

0 1st – 6th grade
1 7th – 9th grade
2 10th – 12th grade
3 High School graduate
4 GED
5 Some College
6 Associates degree or Technical College degree
7 Bachelor's degree or higher

48. Are YOU employed? 0 No 1 Yes – Part Time 2 Yes – Full Time

49. Are YOU currently pregnant? 0 Yes 1 No 2 Does not apply (I am a male) 3 I do not know

50. Have YOU had a baby within the last six months? 0 Yes 1 No 2 Does not apply (I am a male)

51. Are YOU currently breastfeeding? 0 Yes 1 No 2 Does not apply (I am a male)

YOU HAVE FINISHED THIS SECTION ABOUT YOURSELF. THANK YOU!

THE NEXT SECTION IS ABOUT YOUR INFANT.

INFANT

Fill out this section if you have an INFANT under 12 months, if NOT skip to page 8.

52. Do you have an INFANT (less than 12 months) in YOUR household who receives WIC foods or formula? 1 Yes 2 No

53. If YES, did YOUR INFANT receive WIC foods in the past 30 days? 1 Yes 2 No

54. Are you the PRIMARY CAREGIVER for this INFANT? 1 Yes 2 No

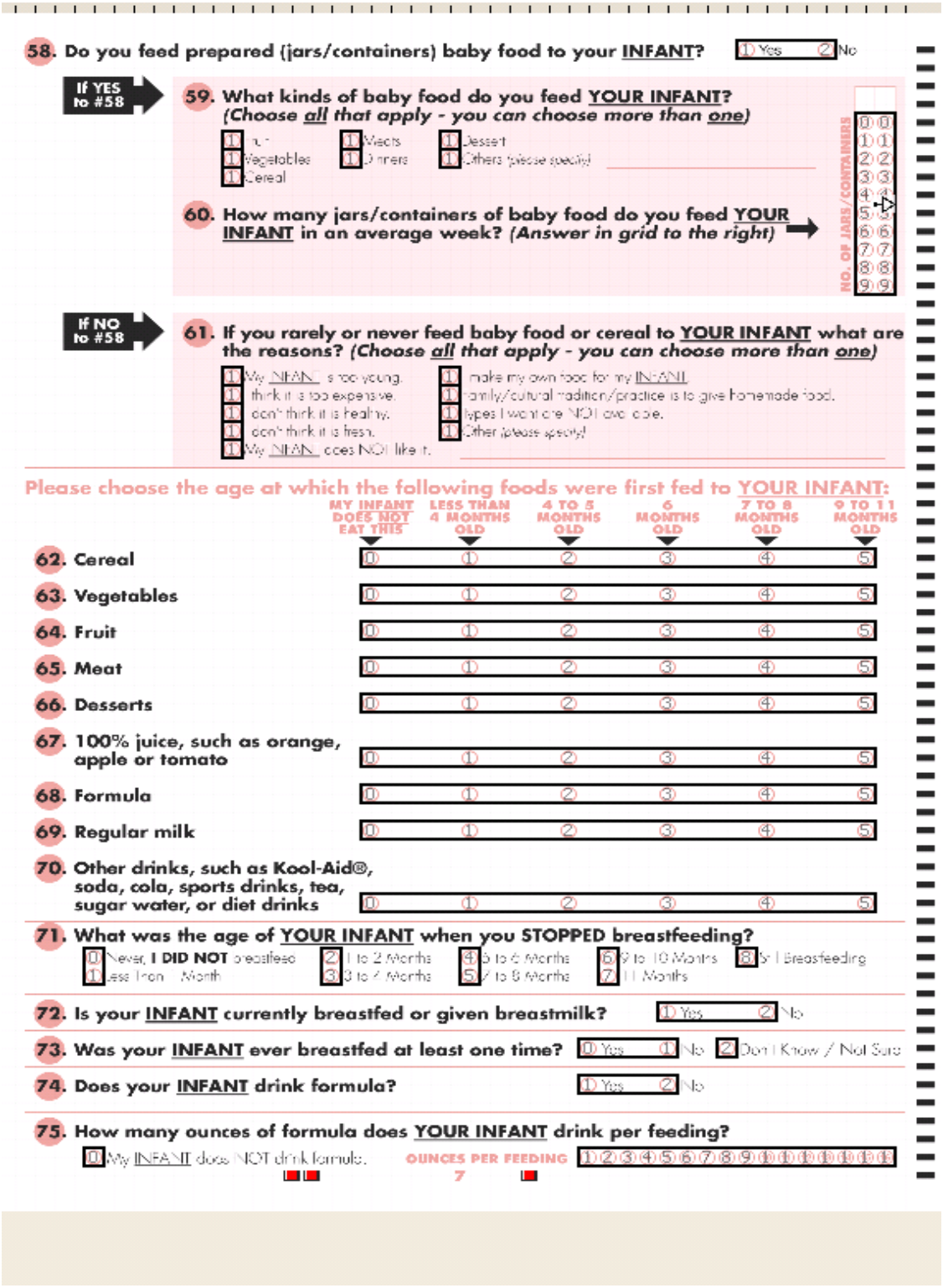
55. Is this INFANT a: 1 Boy 2 Girl

56. How old is YOUR INFANT?

0 Less Than 1 Month Old
1 1 to 2 Months Old
2 3 to 4 Months Old
3 5 Months Old
4 6 Months Old
5 7 to 8 Months Old
6 9 to 10 Months Old
7 11 Months Old

57. Do you feed your INFANT anything other than breastmilk, formula or water? 0 Yes 1 No

Appendix A – *Continued*



58. Do you feed prepared (jars/containers) baby food to your INFANT? 1 Yes 2 No

If YES to #58

59. What kinds of baby food do you feed YOUR INFANT? *(Choose all that apply - you can choose more than one)*

1 Fruits
1 Vegetables
1 Cereal
1 Meats
1 Dinners
1 Dessert
1 Others (please specify) _____

60. How many jars/containers of baby food do you feed YOUR INFANT in an average week? *(Answer in grid to the right)*

NO. OF JARS/CONTAINERS: 0 1 2 3 4 5 6 7 8 9

If NO to #58

61. If you rarely or never feed baby food or cereal to YOUR INFANT what are the reasons? *(Choose all that apply - you can choose more than one)*

1 My INFANT is too young.
1 I think it is too expensive.
1 I don't think it is healthy.
1 I don't think it is fresh.
1 My INFANT does NOT like it.
1 I make my own food for my INFANT.
1 Family/cultural tradition/practice is to give homemade food.
1 Types I want are NOT available.
1 Other (please specify) _____

Please choose the age at which the following foods were first fed to YOUR INFANT:

	MY INFANT DOES NOT EAT THIS	LESS THAN 4 MONTHS OLD	4 TO 5 MONTHS OLD	6 MONTHS OLD	7 TO 8 MONTHS OLD	9 TO 11 MONTHS OLD
62. Cereal	0	1	2	3	4	5
63. Vegetables	0	1	2	3	4	5
64. Fruit	0	1	2	3	4	5
65. Meat	0	1	2	3	4	5
66. Desserts	0	1	2	3	4	5
67. 100% juice, such as orange, apple or tomato	0	1	2	3	4	5
68. Formula	0	1	2	3	4	5
69. Regular milk	0	1	2	3	4	5
70. Other drinks, such as Kool-Aid®, soda, cola, sports drinks, tea, sugar water, or diet drinks	0	1	2	3	4	5

71. What was the age of YOUR INFANT when you STOPPED breastfeeding?

0 Never, I DID NOT breastfeed
1 Less than 1 Month
2 1 to 2 Months
3 3 to 4 Months
4 5 to 6 Months
5 7 to 8 Months
6 9 to 10 Months
7 11 Months
8 Still Breastfeeding

72. Is your INFANT currently breastfed or given breastmilk? 1 Yes 2 No

73. Was your INFANT ever breastfed at least one time? 0 Yes 1 No 2 Don't Know / Not Sure

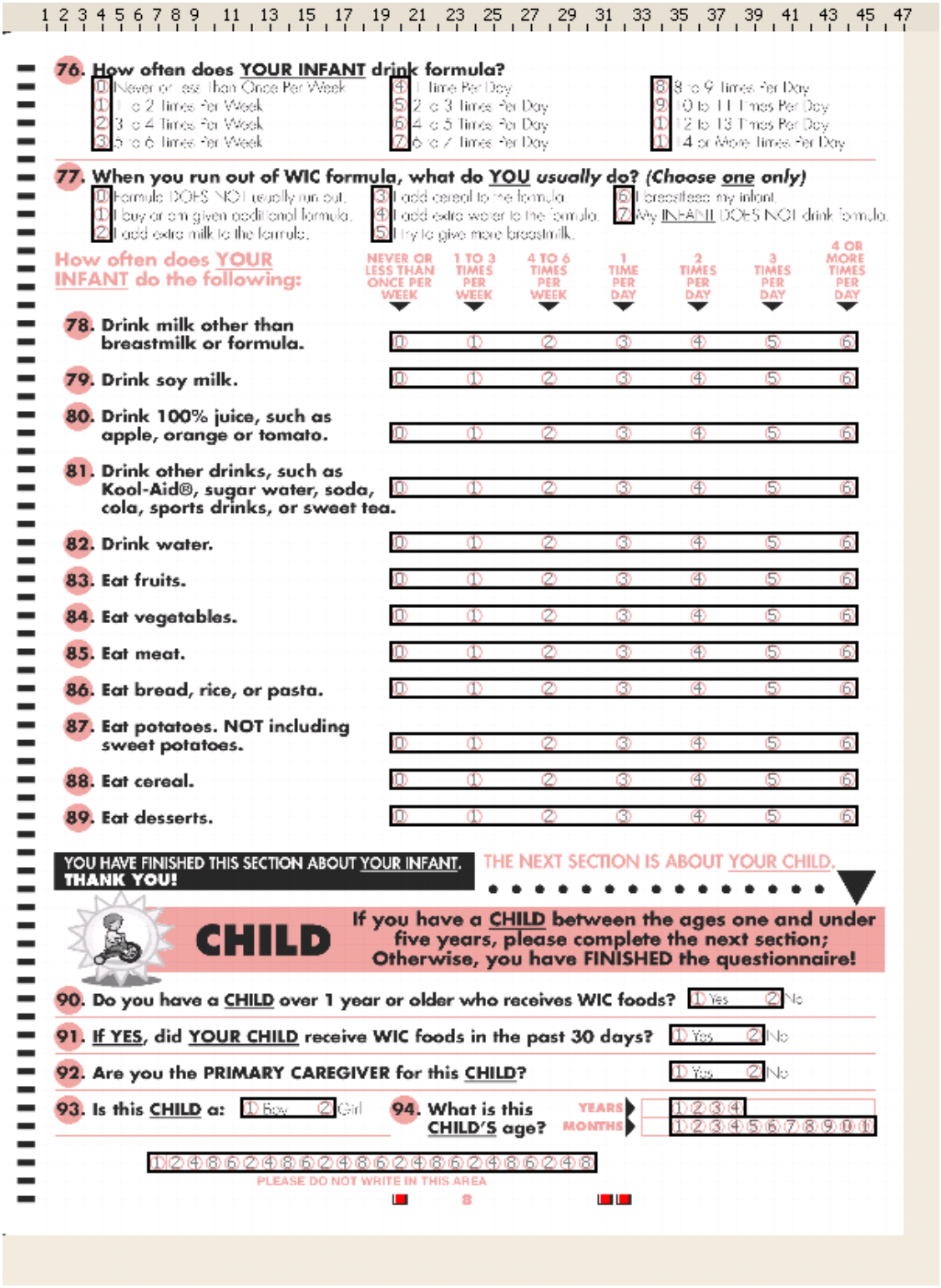
74. Does your INFANT drink formula? 1 Yes 2 No

75. How many ounces of formula does YOUR INFANT drink per feeding?

0 My INFANT does NOT drink formula.

OUNCES PER FEEDING: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Appendix A – *Continued*



1 2 3 4 5 6 7 8 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47

76. How often does YOUR INFANT drink formula?

0 Never or less than Once Per Week
1 1 to 2 Times Per Week
2 3 to 4 Times Per Week
3 5 to 6 Times Per Week
4 1 Time Per Day
5 2 to 3 Times Per Day
6 4 to 5 Times Per Day
7 6 to 7 Times Per Day
8 8 to 9 Times Per Day
9 10 to 11 Times Per Day
10 12 to 13 Times Per Day
11 14 or More Times Per Day

77. When you run out of WIC formula, what do YOU *usually* do? *(Choose one only)*

0 Formula DOES NOT usually run out.
1 I buy or am given additional formula.
2 I add extra milk to the formula.
3 I add cereal to the formula.
4 I add extra water to the formula.
5 I try to give more breastmilk.
6 I breastfeed my infant.
7 My INFANT DOES NOT drink formula.

How often does YOUR INFANT do the following:	NEVER OR LESS THAN ONCE PER WEEK	1 TO 3 TIMES PER WEEK	4 TO 6 TIMES PER WEEK	1 TIME PER DAY	2 TIMES PER DAY	3 TIMES PER DAY	4 OR MORE TIMES PER DAY
78. Drink milk other than breastmilk or formula.	0	1	2	3	4	5	6
79. Drink soy milk.	0	1	2	3	4	5	6
80. Drink 100% juice, such as apple, orange or tomato.	0	1	2	3	4	5	6
81. Drink other drinks, such as Kool-Aid®, sugar water, soda, cola, sports drinks, or sweet tea.	0	1	2	3	4	5	6
82. Drink water.	0	1	2	3	4	5	6
83. Eat fruits.	0	1	2	3	4	5	6
84. Eat vegetables.	0	1	2	3	4	5	6
85. Eat meat.	0	1	2	3	4	5	6
86. Eat bread, rice, or pasta.	0	1	2	3	4	5	6
87. Eat potatoes. NOT including sweet potatoes.	0	1	2	3	4	5	6
88. Eat cereal.	0	1	2	3	4	5	6
89. Eat desserts.	0	1	2	3	4	5	6

YOU HAVE FINISHED THIS SECTION ABOUT YOUR INFANT. THANK YOU!

THE NEXT SECTION IS ABOUT YOUR CHILD.

CHILD

If you have a CHILD between the ages one and under five years, please complete the next section; Otherwise, you have FINISHED the questionnaire!

90. Do you have a CHILD over 1 year or older who receives WIC foods? 1 Yes 2 No

91. If YES, did YOUR CHILD receive WIC foods in the past 30 days? 1 Yes 2 No

92. Are you the PRIMARY CAREGIVER for this CHILD? 1 Yes 2 No

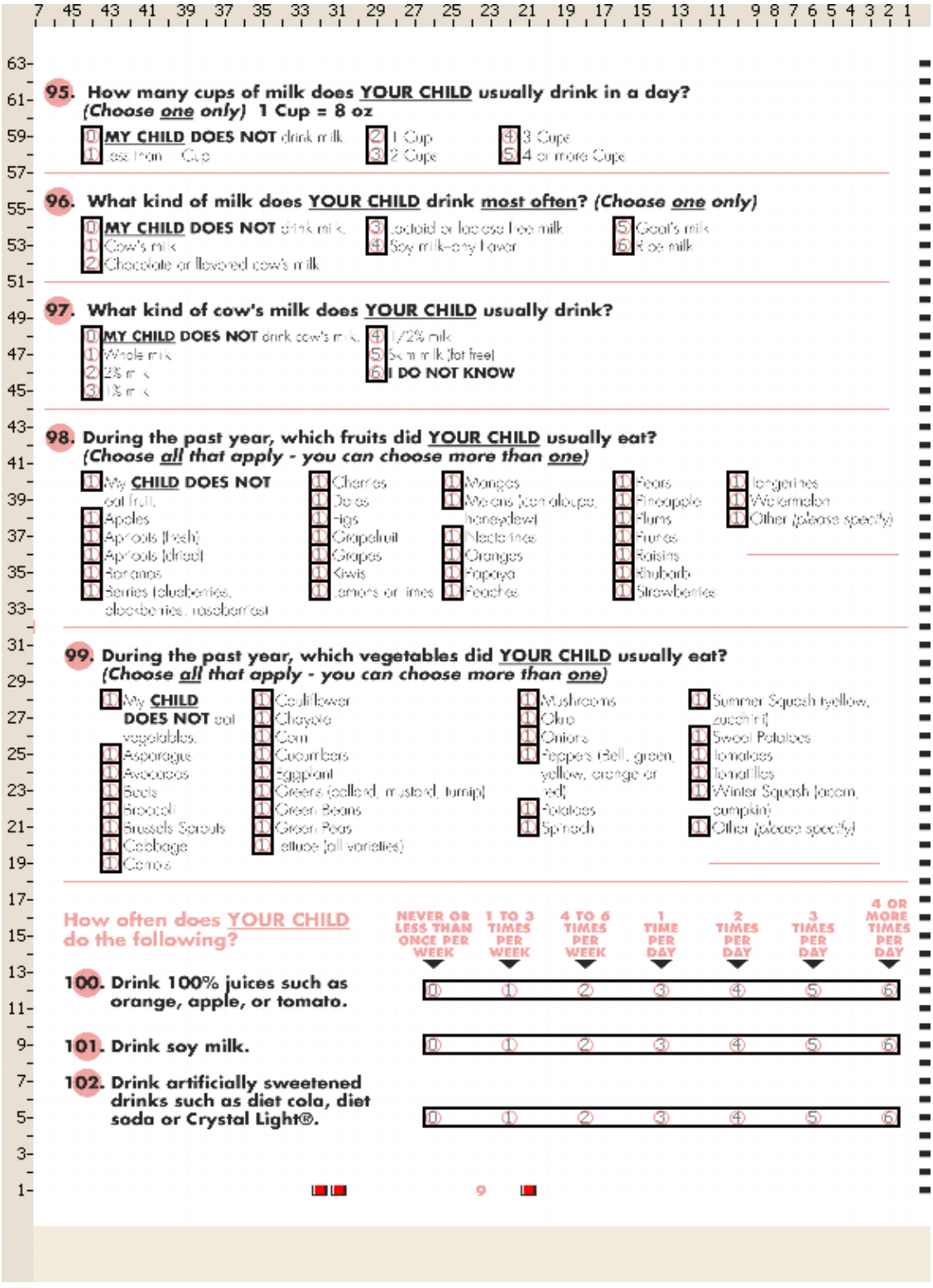
93. Is this CHILD a: 1 Boy 2 Girl

94. What is this CHILD'S age? YEARS 1 2 3 4 MONTHS 1 2 3 4 5 6 7 8 9 10 11

1 2 4 8 6 2 4 8 6 2 4 8 6 2 4 8 6 2 4 8 6 2 4 8

PLEASE DO NOT WRITE IN THIS AREA

Appendix A – *Continued*



95. How many cups of milk does YOUR CHILD usually drink in a day?
***(Choose one only)* 1 Cup = 8 oz**

0 MY CHILD DOES NOT drink milk
1 Less than 1 Cup
2 1 Cup
3 2 Cups
4 3 Cups
5 4 or more Cups

96. What kind of milk does YOUR CHILD drink most often? *(Choose one only)*

0 MY CHILD DOES NOT drink milk
1 Cow's milk
2 Chocolate or flavored cow's milk
3 Lactaid or lactose free milk
4 Soy milk–any flavor
5 Goat's milk
6 Rice milk

97. What kind of cow's milk does YOUR CHILD usually drink?

0 MY CHILD DOES NOT drink cow's milk
1 Whole milk
2 2% milk
3 1% milk
4 ½% milk
5 Skim milk (fat free)
6 I DO NOT KNOW

98. During the past year, which fruits did YOUR CHILD usually eat?
(Choose all that apply - you can choose more than one)

1 My CHILD DOES NOT eat fruit
1 Apples
1 Apricots (fresh)
1 Apricots (dried)
1 Bananas
1 Berries (blueberries, blackberries, raspberries)
1 Cherries
1 Dates
1 Figs
1 Grapefruit
1 Grapes
1 Kiwis
1 Lemons or limes
1 Mangos
1 Melons (cantaloupe, honeydew)
1 Nectarines
1 Oranges
1 Papaya
1 Peaches
1 Pears
1 Pineapple
1 Plums
1 Prunes
1 Raisins
1 Rhubarb
1 Strawberries
1 Tangerines
1 Watermelon
1 Other (please specify)

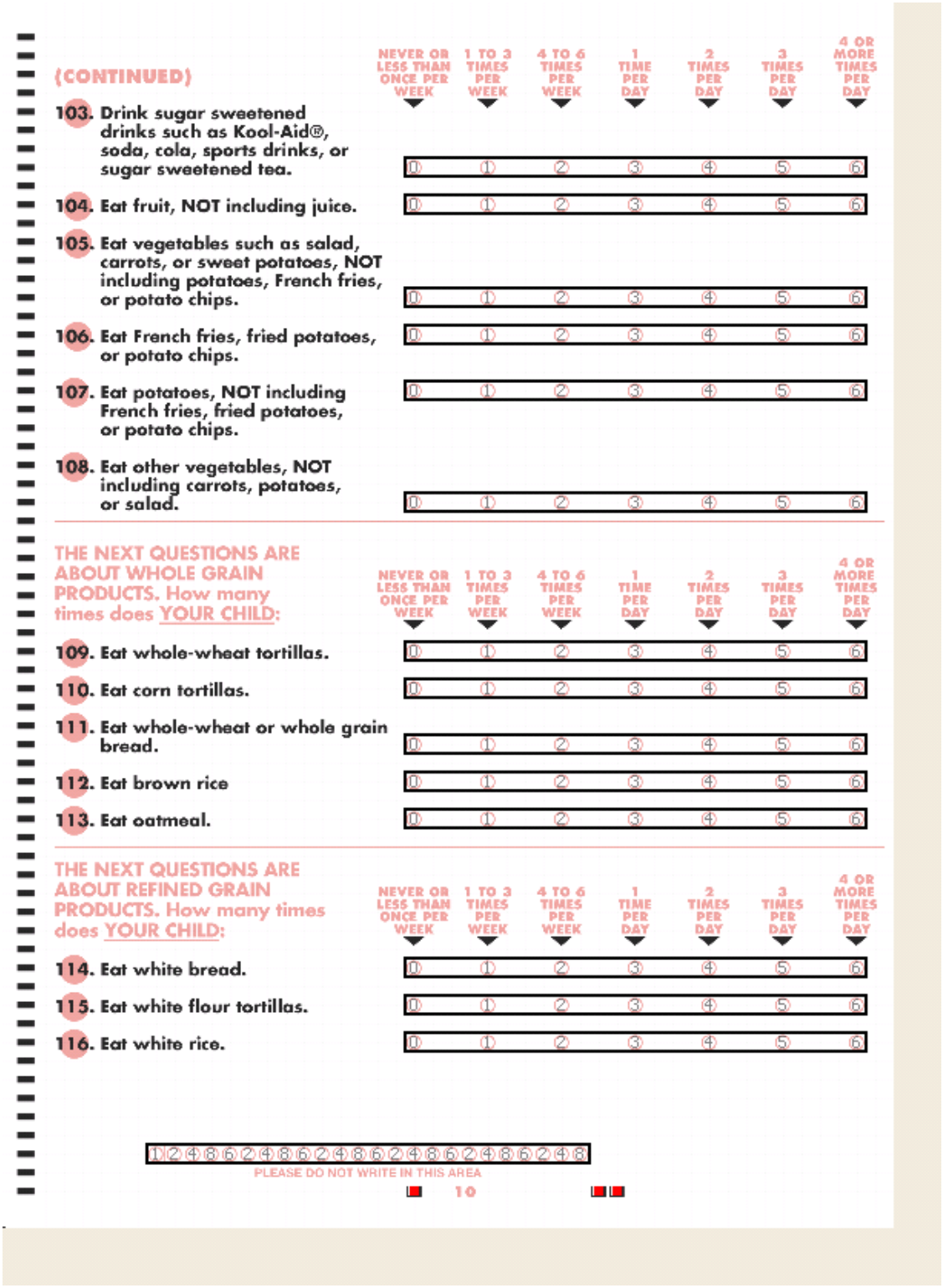
99. During the past year, which vegetables did YOUR CHILD usually eat?
(Choose all that apply - you can choose more than one)

1 My CHILD DOES NOT eat vegetables.
1 Asparagus
1 Avocados
1 Beets
1 Broccoli
1 Brussels Sprouts
1 Cabbage
1 Carrots
1 Cauliflower
1 Chayote
1 Corn
1 Cucumbers
1 Eggplant
1 Greens (collard, mustard, turnip)
1 Green Beans
1 Green Peas
1 Lettuce (all varieties)
1 Mushrooms
1 Okra
1 Onions
1 Peppers (Bell, green, yellow, orange or red)
1 Potatoes
1 Spinach
1 Summer Squash (yellow, zucchini)
1 Sweet Potatoes
1 Tomatoes
1 Tomatillos
1 Winter Squash (acorn, pumpkin)
1 Other (please specify)

How often does YOUR CHILD do the following?

	NEVER OR LESS THAN ONCE PER WEEK	1 TO 3 TIMES PER WEEK	4 TO 6 TIMES PER WEEK	1 TIME PER DAY	2 TIMES PER DAY	3 TIMES PER DAY	4 OR MORE TIMES PER DAY
100. Drink 100% juices such as orange, apple, or tomato.	0	1	2	3	4	5	6
101. Drink soy milk.	0	1	2	3	4	5	6
102. Drink artificially sweetened drinks such as diet cola, diet soda or Crystal Light®.	0	1	2	3	4	5	6

Appendix A – *Continued*



(CONTINUED)

	NEVER OR LESS THAN ONCE PER WEEK	1 TO 3 TIMES PER WEEK	4 TO 6 TIMES PER WEEK	1 TIME PER DAY	2 TIMES PER DAY	3 TIMES PER DAY	4 OR MORE TIMES PER DAY
103. Drink sugar sweetened drinks such as Kool-Aid®, soda, cola, sports drinks, or sugar sweetened tea.	0	1	2	3	4	5	6
104. Eat fruit, NOT including juice.	0	1	2	3	4	5	6
105. Eat vegetables such as salad, carrots, or sweet potatoes, NOT including potatoes, French fries, or potato chips.	0	1	2	3	4	5	6
106. Eat French fries, fried potatoes, or potato chips.	0	1	2	3	4	5	6
107. Eat potatoes, NOT including French fries, fried potatoes, or potato chips.	0	1	2	3	4	5	6
108. Eat other vegetables, NOT including carrots, potatoes, or salad.	0	1	2	3	4	5	6

THE NEXT QUESTIONS ARE ABOUT WHOLE GRAIN PRODUCTS. How many times does YOUR CHILD:

	NEVER OR LESS THAN ONCE PER WEEK	1 TO 3 TIMES PER WEEK	4 TO 6 TIMES PER WEEK	1 TIME PER DAY	2 TIMES PER DAY	3 TIMES PER DAY	4 OR MORE TIMES PER DAY
109. Eat whole-wheat tortillas.	0	1	2	3	4	5	6
110. Eat corn tortillas.	0	1	2	3	4	5	6
111. Eat whole-wheat or whole grain bread.	0	1	2	3	4	5	6
112. Eat brown rice	0	1	2	3	4	5	6
113. Eat oatmeal.	0	1	2	3	4	5	6

THE NEXT QUESTIONS ARE ABOUT REFINED GRAIN PRODUCTS. How many times does YOUR CHILD:

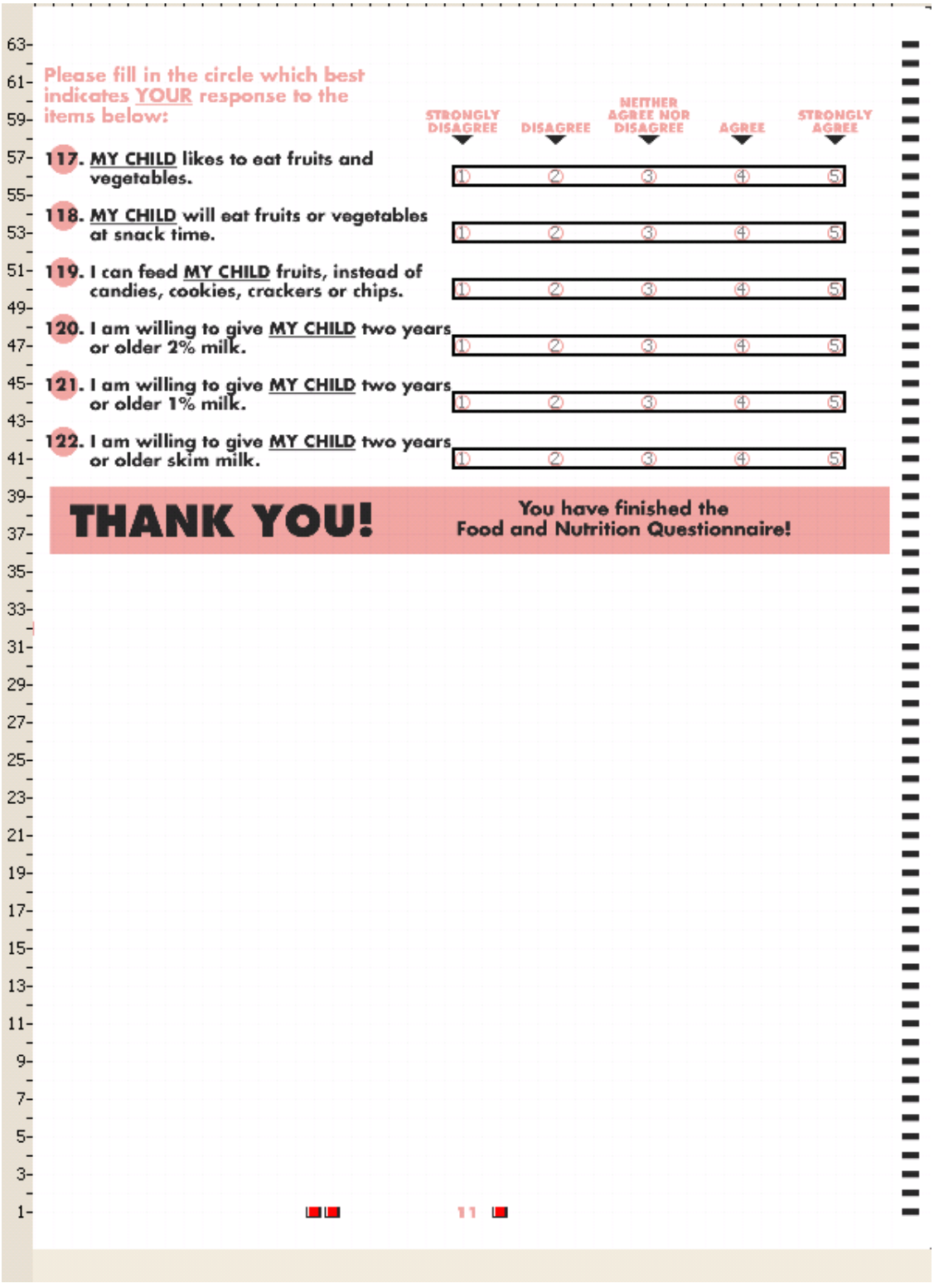
	NEVER OR LESS THAN ONCE PER WEEK	1 TO 3 TIMES PER WEEK	4 TO 6 TIMES PER WEEK	1 TIME PER DAY	2 TIMES PER DAY	3 TIMES PER DAY	4 OR MORE TIMES PER DAY
114. Eat white bread.	0	1	2	3	4	5	6
115. Eat white flour tortillas.	0	1	2	3	4	5	6
116. Eat white rice.	0	1	2	3	4	5	6

1 2 4 8 6 2 4 8 6 2 4 8 6 2 4 8 6 2 4 8 6 2 4 8

PLEASE DO NOT WRITE IN THIS AREA

10

Appendix A – *Continued*



Please fill in the circle which best indicates YOUR response to the items below:

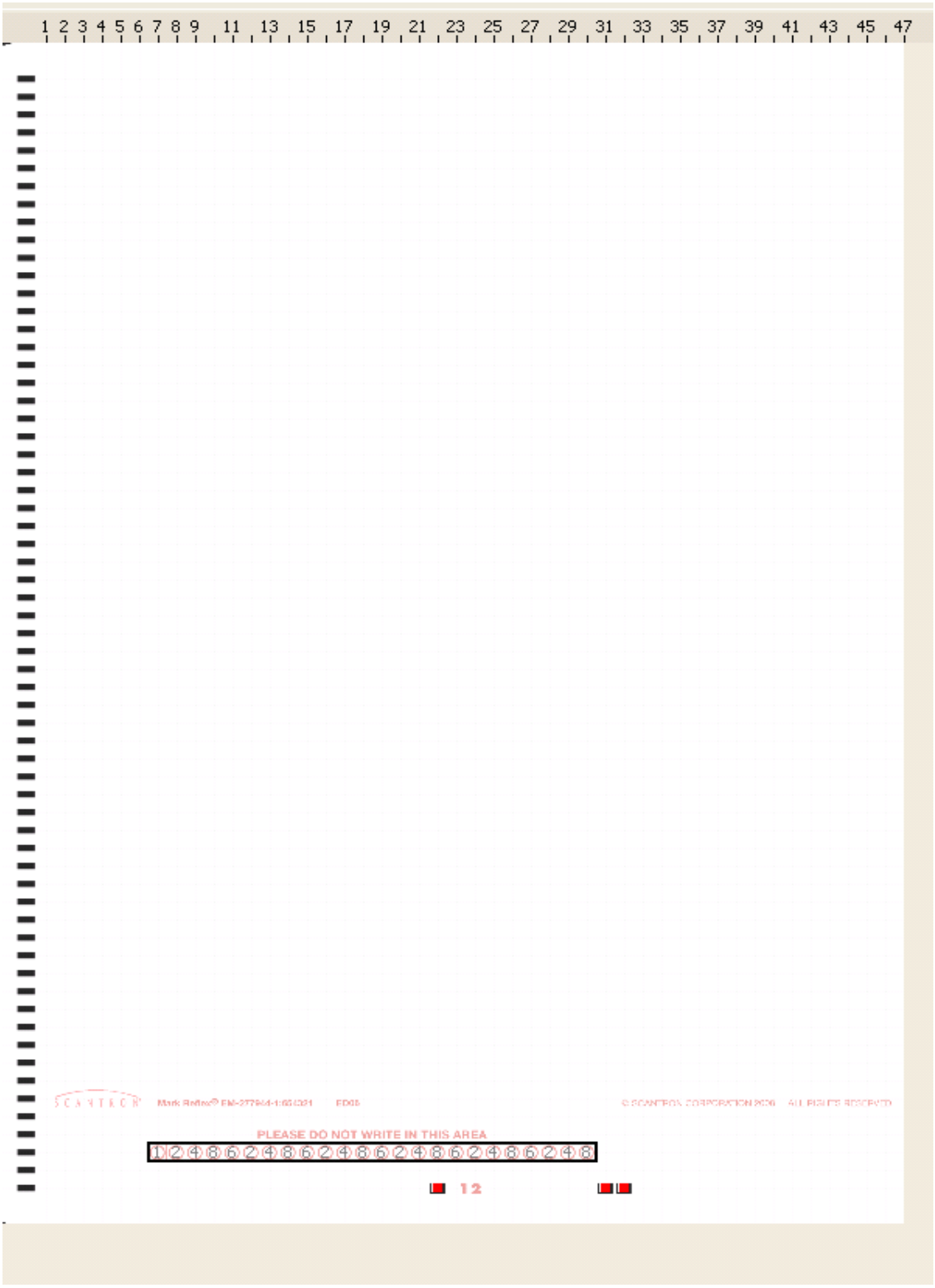
	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
117. MY CHILD likes to eat fruits and vegetables.	1	2	3	4	5
118. MY CHILD will eat fruits or vegetables at snack time.	1	2	3	4	5
119. I can feed MY CHILD fruits, instead of candies, cookies, crackers or chips.	1	2	3	4	5
120. I am willing to give MY CHILD two years or older 2% milk.	1	2	3	4	5
121. I am willing to give MY CHILD two years or older 1% milk.	1	2	3	4	5
122. I am willing to give MY CHILD two years or older skim milk.	1	2	3	4	5

THANK YOU!

You have finished the Food and Nutrition Questionnaire!

11

Appendix A – *Continued*



APPENDIX B

Characteristics of reviewed studies on acculturation and health-related research among Hispanic women in the United

Reference	Health Outcome	Study Design	N	Population	Theoretical Framework	Method of Data Analysis
Abraido-Lanza, A., et al.(2005b).	Breast & Cervical Cancer	Secondary data analysis	1,895	Hispanic Women	Cultural Hypothesis Model	Multiple Linear Regresion (MLR)
Arredondo, E., et al. (2006).	Nutrition Practices	Cross sectional survey design	357	Latinas in San Diego County, CA.	No acculturation theoretical framework	MLR
Ayala, G., et al.(2004).	Obesity	Cross-sectional survey design	357	Mexican-American women	Bidimensional	Correlations, X2 test, One-way ANOVA, MLR, t-test, MANOVA.
Bakhireva, L., et al.(2009).	Pregnancy, Binge Drinking	Cross-sectional survey design	155	Latina women	Unidimensional	Chi-square test, ULR and MLR
Bender, D. and Castro, D. (2000).	Low birth weight	Qualitative, focus groups interviews.	21	Latina women in Orange Co. NC.	No acculturation theoretical framework	Analysis, both ‘‘sought’’ and ‘‘emergent’’ themes. Photonarratives.
Boeckner, L., et al. (2006).	Nutrition Practices	Cross-sectional survey design.	70	US-Born Hispanic Women	No acculturation theoretical framework	One-way ANOVA
Boeckner, L., et al.(2000).	Nutrition Practices	Cross-sectional survey design.	55	Immigrant & US-Born Hispanic women	No acculturation theoretical framework	One-way ANOVA
Borrayo, E, et al.(2004).	Cervical cancer Screening	Cross-sectional survey design.	153	Latina women in the US	No acculturation theoretical framework, acculturation was defined as a variable.	Discriminant Function Analysis (DFA)
Bothwell, E., et al.(2009).	Physical Activity	Secondary data analysis.	357	Mexican & Mexican - American Women living in San Diego, Ca.	No acculturation theoretical framework - Acculturation is considered a social & individual construct.	Multivariate Logistic Regression
Brown, J., et al.(2003).	Reproductive Health	Cross-sectional survey design.	703	Hispanic women born in and outside the US. 164 of subjects met all 3 criteria.	No acculturation theoretical framework - Acculturation is considered a variable.	Bivariate Association & Multivariate analysis using a hierarchical approach
Byrd, T., et al.(2004).	Cervical cancer Screening	Cross-sectional survey design.	200	Hispanic women 18-25 yrs in El Paso, Tx.	No acculturation theoretical framework - Acculturation is a variable	Descriptive, Bivariate associations &MLR
Cachelin, F., et al. (2006).	Body Image	Cross-sectional survey design.	276	Mexican-American Women	No acculturation theoretical framework - Acculturation is a variable	A four-factor MANOVA
Ceballos, M. and A. Palloni (2010).	Maternal & Infant Health	Secondary data analysis	404	Mexican-born Women living in the US.	Acculturation Paradox	Logistic Regression Analysis
Chen, P., et al.(2009).	Mental Health	Cross-sectional survey design.	146	Hispanic women	No acculturation theoretical framework - Acculturation is a variable	Chi square, ANOVA, Linear & Logistic Regression Analyses.
Davila, M., et al. (2009).	Perinatal Health	Secondary data analysis	439	Pregnant and postpartum Latina women	No acculturation theoretical framework - Acculturation is a variable	Pearson’s chi-square test of independence; ULR

Appendix B – *Continued*

Reference	Health Outcome	Study Design	N	Population	Theoretical Framework	Method of Data Analysis
Dixon, D., et al. (2010).	HIV	Cross-sectional survey design.	187	Puerto Rican Women	No acculturation theoretical framework - Acculturation is a variable	Pearson product moment correlations; HRA
Elder, J., et al. (2006).	Nutrition Practices	Randomized Controlled Trial (RCT)	357	Latinas	No acculturation theoretical framework - Acculturation is a variable	ANCOVA
Espinosa de Los Monteros, K., et al.(2008).	Obesity & Metabolic Syndrome	Cross-sectional survey design.	141	Latinas in San Diego, Ca.	Individual & Area-based Acculturation	Factor Analysis (FA), Bivariate associations, Multiple Linear & MLR Analyses
Evenson, K., et al. (2003).	Physical Activity	Cross-sectional survey design.	671	Hispanic immigrant women living in North Carolina.	No acculturation theoretical framework - Acculturation is a variable	Bivariate Correlation using Spearman Correlation coefficients, Logistic Regression Analysis
Evenson, K., et al.(2004).	Physical Activity	Cross-sectional survey design.	671	Hispanic immigrant women living in North Carolina.	No acculturation theoretical framework - Acculturation is a variable	Bivariate Spearman Correlation, ULR
Fernandez, M. et al.(2009).	Cervical Cancer Screening	Cross-sectional survey design.	713	Low Income Mexican-American women.	No acculturation theoretical framework - Acculturation is a variable	EFA, CFA, t- tests dependent-samples, correlations. ULR
Fitzgerald, N., et al.(2008).	Nutrition Practices	Case-control study	201	Latina women living in	No acculturation theoretical framework - Acculturation is a variable	Independent samples t test. Mann-Whitney U. X2 tests. Multivariate Logistic Regression
Fitzgibbon, M., et al. (2003).	Breast Cancer Education	Randomized Controlled Trial (RCT).	256	Latinas living in Chicago, Illinois.	No acculturation theoretical framework - Acculturation is a variable	Student's t test for unpaired data. Chi-square.
Garcés, I. et al. (2006).	Health Care Seeking	Qualitative study - Focus groups.	54	Latina immigrants 19-62 yrs living in Alabama.	No acculturation theoretical framework - Qualitative study	Focus Groups.
Garcia, L.,et al.(2005).	Mental Health	Cross-sectional survey design.	464	Latina women living in Los Angeles	No acculturation theoretical framework - Acculturation is a variable	Logistic Regression Analysis
Graves, K., et al.(2008).	Breast Cancer	Cross-sectional survey design.	450	Latina women from Central & South America.	No acculturation theoretical framework - Acculturation is a variable	Bivariate Correlation, Chi-square, t-tests, ANOVA, Linear and Logistic Regression Analysis.
Griffiths, C. and Kupermann, M. (2008).	Prenatal Health	Qualitative study	33	Latina women living in rural areas of California.	No acculturation theoretical framework - Acculturation is a variable - this is a qualitative study	Descriptives of SES, Acculturation, and themes from interviews.
Harley, K. and Eskenazi, B. (2006).	Prenatal Health	Cross-sectional survey design.	568	Pregnant latina women enrolled in prenatal care in the Salinas Valley,	There is an acculturation theoretical framework	T-tests, ANOVA account for multiple comparisons. Logistic Regression.
Haskins, A., et al.(2010).	Prenatal Health & Tobacco Use	Cross-sectional survey design.	351	Hispanic prenatal care patients.	No acculturation theoretical framework - Acculturation is a variable	Multivariate Logistic Regression, Logistic Regression Analysis

Appendix B – *Continued*

Reference	Health Outcome	Study Design	N	Population	Theoretical Framework	Method of Data Analysis
Heilemann, M., et al. (2004).	Mental Health	Cross-sectional survey design.	129	Women of Mexican descent	No acculturation theoretical framework - Acculturation is a variable	Bivariate Pearson Correlation, t-test, Chi square.
Heilemann, M., et al. (2000).	Perinatal Health	Secondary data analysis.	773	Women of Mexican descent	No acculturation theoretical framework	Bivariate Pearson Correlation, t-test
Heilemann, M., et al. (2005).	Mental Health	Cross-sectional survey design.	315	Women of Mexican descent living in Northern California.	No acculturation theoretical framework - Acculturation is a variable	Bivariate Pearson Correlation, t-test
Hessol, N., et al.(2004).	Maternal Health	Cross-sectional survey design.	350	Pregnant latina women	No acculturation theoretical framework. Acculturation not considered.	Multiple Logistic Regression Analysis
Jurkowski, J., et al.(2010).	Physical Activity	Cross-sectional survey design, Community Based Partiipatory Research.	289	Latinas living in northeastern New York	No acculturation theoretical framework - Acculturation is a variable	Pearson chi-square, t-tests (2-sided). Multivariate Logistic Regression
Kasirye, O., et al. (2005).	Prenatal Health	Cross-sectional survey design.	1,121	Latina pregnant women in California	Yes acculturation theoretical framework	ROC curve analysis
Kepka, D., et al.(2010).	Cervical Cancer Education	Secondary data analysis of a nationally representative sample.	945	Latina women	Uses acculturation framework of the 2003-2004 NHANES	Chi-square, MLR
Kobetz, E., et al. (2010).	Cervical Cancer Education	Cross-sectional survey design.	1,211	Hispanic female residing in the United States.	No acculturation theoretical framework - Acculturation is a variable.	Jackknife Variance Estimation Technique.
Kuo, W.-H., et al.(2004).	Mental Health - Postpartum Depression	Cross-sectional survey design.	3,952	Hispanic women living in Miami, NYC & San Fco.	No acculturation theoretical framework - Acculturation is a variable.	Chi-square, MLR
Lagos, V., et al. (2008).	Cancer Screening	Cross-sectional survey design.	50	Underserved Latinas	No acculturation theoretical framework - Acculturation is a variable.	Bivariate Spearman's Rho Correlation, t-tests
Leybas-Amedia, V., et al.(2005).	Health Care Access	Cross-sectional survey design.	417	Hispanic women Yuma County,AZ.	No acculturation theoretical framework - Acculturation is a variable.	ANOVA, Kruskal-Wallis.
Lopez, V. and Castro, F. (2006).	Cancer Education	Quasi-Experimental Pre-Post with Controls.	447	Hispanic women	No acculturation theoretical framework - Acculturation is a variable.	OLS,HRM.
Lora, K., et al.(2010).	Nutrition Practices	Quasi-Experimental Pre-Post with Controls.	162	1st generation Latinas from Lincoln & Omaha, Nebraska.	No acculturation theoretical framework	Bivariate Pearson Correlation, Rosner & Willett

Appendix B – *Continued*

Reference	Health Outcome	Study Design	N	Population	Theoretical Framework	Method of Data Analysis
Mack, K., et al. (2009).	Breast Cancer Screening	Cross-sectional survey design	1,298	Latina women living in California.	No acculturation theoretical framework - Acculturation is a variable.	ULR, MLR, Analysis of Colinearity, Chi-square
Martinez-Schallmoser, L., et al.(2003).	Postpartum Depression	Longitudinal prospective	66	Multiparous Mexican American women	Authors propose a multiple component model of acculturation.	Factor Analysis, Pairwise t-test, Logistic Regression Analysis, Multiple Logistic Regression Analysis
Norman, S., et al. (2004).	Nutrition Practices	Cross-sectional survey design	119	Latinas.	Use 4 different models	Correlation to identify confounders or potential covariates. Multiple Logistic Regression,
Rojas-Guyler, L., et al.(2005).	Reproductive Health / HIV	Cross-sectional survey design	295	Hispanic women attending a health care center.	No acculturation theoretical framework - Acculturation is a variable.	Bivariate Spearman's Rho Correlation, Kruskal-Wallis, Chi-square test
Sanchez, M., et al.(2010).	Reproductive Health / HIV	Cross-sectional survey design	339	Latina women living in LA, CA.	No acculturation theoretical framework - Acculturation is a variable.	CFA, SEM
Shah, M., et al. (2006).	Cervical cancer Screening	Secondary data analysis	2,307	Hispanic women aged 21-70	No acculturation theoretical framework - Acculturation is a variable.	Logistic Regression Analysis (LRA)
Sussner, K., et al. (2009).	Genetic Testing	Secondary data analysis	103	Latinas living in East Harlem, NYC.	Multidimensional model	Univariate (ULR) & Multivariate Linear Regression Models
Sussner, K., et al. (2010).	Genetic Testing	Mixed Methods	25	Latinas living in East Harlem, NYC.	Some theoretical framework - Acculturation is a variable.	Descritives
Vadaparampil, S., et al.(2010).	Genetic Testing	Cross-sectional survey design.	53	Hispanic women living in Tampa, Florida.	No acculturation theoretical framework.	Descriptives
Venkat, P., et al. (2008).	Sexual & Reproductive Health	Cross-sectional survey design.	102	Latina women living in NYC	No acculturation theoretical framework - Acculturation is a variable	ANOVA
Voorhees, C. and Young, D. (2003).	Physical Activity	Cross-sectional survey design.	285	Hispanic/Latino women	No acculturation theoretical framework	ULR
Watts, L., et al.(2009).	Cervical Cancer Screening	Cross-sectional survey design.	318	Hispanic women living in the US	No acculturation theoretical framework - Acculturation is a variable.	Two-sample Student's t-test and Pearson Chi-square statistic, ULR
Wilbur, J., et al.(2003).	Physical Activity	Cross-sectional survey design.	300	Latinas 20 - 50 yrs living in Chicago	No acculturation theoretical framework - Acculturation is a variable.	Logistic Regression Analysis
Wingo, P., et al. (2009).	Health Disparities	Secondary data analysis	1,673	Mexican American women aged 15–44 years.	No acculturation theoretical framework - Acculturation is a variable.	Age-adjusted Prevalence, Satterthwaite adjusted F test, Student's t-test
Wolin, K., et al.(2009).	Nutrition Practices	Secondary data analysis.	388	Hispanic women from the Chicago Breast Health Project.	Unidimensional scales.	ULR

APPENDIX C

Summary of quality scores of the literature reviewed on acculturation

Reference	Utilization of Theory Models	Conceptualization	Operationalization	MQS	Total	%
Abraido-Lanza, A., et al.(2005b).	3	3	3	4	13	100
Arredondo, E., et al. (2006).	1	2	3	4	10	76.9
Ayala, G., et al. (2004).	3	3	3	4	13	100
Bakhireva, L., et al. (2009).	2	1	0	4	7	53.8
Bender, D. & Castro, D. (2000).	n.a.	n.a.	n.a.	4	4	100
Boeckner, L., et al. (2006).	0	0	0	4	4	30.8
Boeckner, L., et al.(2000).	0	0	0	2	2	15.4
Borrayo, E, et al.(2004).	1	3	3	4	11	84.6
Bothwell, E., et al.(2009).	1	2	3	2	8	61.5
Brown, J., et al.(2003).	1	2	3	3	9	69.2
Byrd, T., et al.(2004).	0	3	3	4	10	76.9
Cachelin, F., et al. (2006).	1	3	3	4	11	84.6
Ceballos, M.,& Palloni, A. (2010).	3	3	3	4	13	100
Chen, P., et al.(2009).	1	1	2	4	8	61.5
Davila, M., et al. (2009).	2	3	3	4	12	92.3
Dixon, D., et al. (2010).	0	1	3	4	8	61.5
Elder, J.,et al. (2006).	0	1	2	3	6	46.2
Espinosa de Los Monteros, K., et al. (2008).	3	3	3	3	12	92.3
Evenson, K., et al. (2003).	1	1	2	4	8	61.5
Evenson, K., et al.(2004).	1	1	2	4	8	61.5
Fernandez, M. et al.(2009).	1	2	3	4	10	76.9
Fitzgerald, N., et al. (2008).	1	2	3	4	10	76.9
Fitzgibbon, M.,et al.(2003).	1	1	3	3	8	61.5

Appendix C – *Continued*

Reference	Utilization of Theory Models	Conceptualization	Operationalization	MQS	Total	%
Garcés, I. et al. (2006).	0	0	0	0	0	0
Garcia, L.,et al.(2005).	1	3	3	4	11	84.6
Graves, K., et al.(2008).	1	1	2	3	7	53.8
Griffiths, C., &Kupermann, M. (2008).	1	1	1	2	5	38.5
Harley, K.,&Eskenazi, B. (2006).	3	3	3	4	13	100
Haskins, A., et al.(2010).	0	1	1	2	4	30.8
Heilemann, M., et al. (2004).	1	2	2	3	8	61.5
Heilemann, M., et al. (2000).	2	2	2	2	8	61.5
Heilemann, M., et al. (2005).	2	1	2	2	7	53.8
Hessol, N., et al.(2004).	0	0	2	2	4	30.8
Jurkowski, J., et al.(2010).	1	2	2	3	8	61.5
Kasirye, O., et al. (2005).	3	3	3	4	13	100
Kepka, D., et al.(2010).	3	3	3	4	13	100
Kobetz, E., et al. (2010).	0	0	0	1	1	7.7
Kuo, W.-H., et al.(2004).	1	2	3	4	10	76.9
Lagos, V., et al. (2008).	1	1	3	4	9	69.2
Leybas-Amedia, V., et al.(2005).	2	3	3	4	12	92.3
Lopez, V. &Castro, F. (2006).	2	2	2	4	10	76.9
Lora, K., et al.(2010).	0	0	0	0	0	0
Mack, K., et al. (2009).	1	1	1	3	6	46.2
Martinez-Schallmoser, L., et al.(2003).	3	3	3	4	13	100
Norman, S., et al. (2004).	3	3	3	4	13	100
Rojas-Guyler, L., et al. (2005).	2	2	3	3	10	76.9

Appendix C – *Continued*

Reference	Utilization of Theory Models	Conceptualization	Operationalization	MQS	Total	%
Sanchez, M., et al.(2010).	1	2	2	4	9	69.2
Shah, M., et al. (2006).	1	1	2	4	8	61.5
Sussner, K., et al. (2009).	3	3	3	4	13	100
Sussner, K., et al. (2010).	2	3	3	4	12	92.3
Vadaparampil, S., et al.(2010).	n.a.	n.a.	n.a.	3	3	23.1
Venkat, P., et al. (2008).	1	2	3	3	9	69.2
Voorhees, C.& Young, D. (2003).	0	0	0	2	2	15.4
Watts, L., et al.(2009).	1	2	2	4	9	69.2
Wilbur, J., et al.(2003).	1	2	3	4	10	76.9
Wingo, P., et al. (2009).	2	3	3	4	12	92.3
Wolin, K., et al.(2009).	2	3	3	4	12	92.3

Note: n.a. = Not Applicable

APPENDIX D

Description of measures used in the study

#	Name	Code	Description	Level of Measurement	TEXFAN Question Number
DEMOGRAPHIC MEASURES					
1	Age	AGES	Amount of time during which a person has lived.	Continuous	40
2	Zipcode	ZPCD	Five (5) digit postal code of respondent's area of residence.	Categorical	41
3	Area of Residence (B-NB)	ABNB	Recoded to identify respondent's place of residence immediately next to the international Borderline with Mexico or not.	Categorical	41
4	Gender	GEND	State of being male or female.	Categorical	42
5	Race	RACE	Ethnicity using the standard US Census classifications (US Census).	Categorical	46
6	Educational Attainment	EDAT	Highest level of education that an individual has completed.	Categorical	47
7	Employment	EMPY	Work that a person is paid to do, the state of being paid to do a job.	Categorical	48
ANTHROPROMETRIC MEASURES					
8	Height	HGHT	Distance from the bottom to the top of a person.	Continuous	42
9	Weight	WGHT	A unit of measurement used for showing how heavy someone is.	Continuous	44
10	Body Mass Index	BMI	Ratio between a person's weight and a person's height squared; the formula used was .	Continuous	n.a.
11	Weight Status	WTST	Recoded BMI scores into the CDC's 5 weight status categories for both male and female adults.	Categorical	n.a.

Appendix D – *Continued*

#	Name	Code	Description	Level of Measurement	TEXFAN Question Number
BEHAVIORAL MEASURES					
12	Language Spoken at Home	LSHO	Language most frequently preferred for communication at the place of residence of the respondent.	Categorical	45
13	Survey Language	SVLG	Language preferred to answer the survey questionnaire.	Categorical	n.a.
14	Acculturation	ACCU	Process in which members of one cultural group adopt the beliefs and behaviors of another group.	Categorical	n.a.
NUTRITIONAL MEASURES					
15	Buy fresh fruits and vegetables	BFFV	Condition of respondent explaining how often the person buys fresh fruits and vegetables of the food choices offered by the WIC Program.	Categorical	30
16	Prepare meals with fruits and vegetables	MFVG	Condition of respondent explaining how often the person prepares meals using fresh fruits and vegetables offered by the WIC Program.	Categorical	31
	Food Consumption				
17	Eat Fruit	ETFR	Condition of respondent explaining how often she eats fruit, not including juice, of the food choices offered by WIC Program.	Categorical	12
18	Eat vegetables	ETVE	Condition of respondent explaining how often she eats vegetables, of the food choices offered by WIC Program.	Categorical	13

Appendix D – *Continued*

#	Name	Code	Description	Level of Measurement	TEXFAN Question Number
19	Eat Potatoes	ETPO	Condition of respondent explaining how often she eats potatoes per week.	Categorical	15
20	Eat French Fries	ETFF	Condition of respondent explaining how often she eats French fries, fried potatoes or potato chips per week.	Categorical	14
21	Eat Other Vegetables	ETOV	Condition of respondent explaining how often she eats other vegetables per week.	Categorical	16
22	Eat Whole Wheat Tortillas	EWWT	Condition of respondent explaining how often the person eats whole wheat tortillas per week.	Categorical	17
23	Eat Corn Tortillas	ECTT	Condition of respondent explaining how often the person eats corn tortillas per week.	Categorical	18
24	Eat Whole Grain Bread	EWGB	Condition of respondent explaining how often the person eats whole wheat or whole grain bread per week.	Categorical	19
25	Eat Brown Rice	ETBR	Condition of respondent explaining how often the person eats brown rice per week.	Categorical	20
26	Eat Oatmeal	ETOM	Condition of respondent explaining how often the person eats oatmeal per week.	Categorical	21
27	100% Juice	HPCJ	Condition of respondent explaining how often the person drinks 100% juice, such as orange, apple, or tomato, per week.	Categorical	8
28	Art. Sweet. Beverage	ATSB	Condition of respondent explaining how often she drinks artificially swtnd drinks a week.	Categorical	9
29	Sugar Sweetened Drinks	DSSD	Condition of respondent explaining how often she drinks sugar-sweetened drinks a week.	Categorical	11

Appendix D – *Continued*

#	Name	Code	Description	Level of Measurement	TEXFAN Question Number
30	Eat White Bread	ETWB	Condition of respondent explaining how often the person eats whole white bread a week.	Categorical	22
31	Eat White Flour Tortillas	EWFT	Condition of respondent explaining how often the person eats white flour tortillas per week.	Categorical	23
32	Eat White Rice	ETWR	Condition of respondent explaining how often the person eats white rice per week.	Categorical	24
OUTCOME VARIABLE					
33	Pattern of Food Consumption	PTFC	Latent dependent variable resulting from the addition of food consumption variables scores	Categorical	n.a.

Note: n.a. = Not Applicable

APPENDIX E

Analysis of non-missing versus missing data for weight by consumption of fruits and vegetables

Daily Average Servings	Frequency			Any Missing			
	Non-Missing	Missing	Pct. (%) Missing	No		Yes	
				Mean	SD	Mean	SD
F&V Average	2,774	488	14.96	3.64	2.95	3.59	2.99
Fruit Juice	2,825	511	15.32	1.26	1.15	1.37	1.24
Artificially Sweetened Beverages	2,825	511	15.32	0.55	0.85	0.55	0.87
Sugar Sweetened Beverages	2,824	511	15.32	0.83	1.07	0.88	1.15
Fruit	2,823	510	15.30	1.34	1.19	1.27	1.22
Vegetables	2,825	511	15.32	1.14	1.10	1.10	1.10
Potatoes	2,824	511	15.32	0.46	0.63	0.46	0.67
Other Vegetables	2,777	489	14.97	0.69	0.87	0.72	0.90
French Fries	2,741	478	14.85	0.42	0.63	0.47	0.73
White Bread	2,798	489	14.88	0.51	0.76	0.58	0.86
White Flour Tortillas	2,787	486	14.85	0.47	0.73	0.47	0.75
White Rice	2,797	499	15.14	0.41	0.62	0.46	0.66
Whole Wheat Tortillas	2,750	475	14.73	0.27	0.62	0.31	0.73
Corn Tortillas	2,784	497	15.15	0.99	1.06	1.12	1.18
Whole Grain Bread	2,774	492	15.06	0.67	0.84	0.69	0.88
Brown Rice	2,764	489	15.03	0.22	0.51	0.27	0.58
Oatmeal	2,795	494	15.02	0.39	0.60	0.43	0.69

APPENDIX F

Variable correlations among respondents with missing data

	AGES	ABNB	RACE	EDAT	EMPY	ACCU	BFFV	MFVG	FVDC	CCFJ
AGES	1	0.01	-0.03	-0.08	0.11	-0.09	0.11	0.14	0.00	-0.02
ABNB		1	-0.13	0.20	0.02	-0.10	0.01	0.09	0.04	-0.07
RACE			1	0.10	0.04	0.19	-0.07	-0.05	0.00	0.07
EDAT				1	0.31	0.44	-0.08	0.02	0.04	-0.07
EMPY					1	0.32	-0.19	-0.15	-0.14	-0.12
ACCU						1	-0.21	-0.14	0.04	-0.03
BFFV							1	0.60	0.31	0.20
MFVG								1	0.30	0.17
FVDC									1	0.42
CCFJ										1

Appendix F – *Continued*

	ASBV	SSBV	ETFR	ETVG	ETPO	ETOV	ETFF	ETWB	ETWF	ETWR	ETWW	ETCT	ETWG	ETBR	ETOM
AGES	0.00	-0.16	-0.02	0.03	-0.06	0.02	-0.10	-0.02	-0.11	-0.02	0.07	-0.01	0.04	0.02	-0.02
ABNB	0.07	0.04	0.00	0.09	0.01	0.03	0.02	-0.11	-0.01	-0.08	-0.02	-0.06	-0.03	0.00	0.02
RACE	0.07	0.09	-0.02	0.05	-0.02	0.00	0.03	0.05	-0.01	-0.08	-0.01	-0.08	0.01	0.03	0.00
EDAT	0.01	0.10	0.01	0.05	0.05	0.06	0.02	-0.04	-0.01	-0.12	-0.07	-0.34	0.01	-0.09	-0.05
EMPY	0.00	0.07	-0.18	-0.10	0.02	-0.09	-0.01	-0.02	-0.08	-0.11	-0.12	-0.27	-0.10	-0.11	-0.10
ACCU	0.08	0.20	-0.01	0.05	0.12	0.03	0.14	0.03	0.05	-0.11	-0.10	-0.44	0.01	-0.14	-0.10
BFFV	-0.03	-0.08	0.27	0.30	0.02	0.27	-0.03	0.00	-0.02	0.06	0.15	0.24	0.16	0.16	0.13
MFVG	-0.05	-0.10	0.20	0.32	0.06	0.27	-0.07	0.02	-0.03	0.08	0.12	0.13	0.19	0.13	0.21
FVDC	0.23	0.18	0.82	0.84	0.58	0.75	0.40	0.23	0.19	0.26	0.22	0.29	0.40	0.31	0.42
CCFJ	0.20	0.16	0.41	0.32	0.24	0.25	0.24	0.22	0.21	0.20	0.19	0.25	0.19	0.25	0.24

Appendix F – *Continued*

	ASBV	SSBV	ETFR	ETVG	ETPO	ETOV	ETFF	ETWB	ETWF	ETWR	ETWW	ETCT	ETWG	ETBR	ETOM
ASBV	1	0.29	0.13	0.19	0.21	0.20	0.26	0.13	0.14	0.09	0.10	0.09	0.11	0.01	0.06
SSBV		1	0.10	0.16	0.29	0.09	0.47	0.26	0.31	0.11	0.05	0.01	0.13	0.01	-0.02
ETFR			1	0.57	0.33	0.41	0.23	0.09	0.08	0.17	0.17	0.22	0.32	0.26	0.30
ETVG				1	0.31	0.55	0.30	0.16	0.14	0.16	0.21	0.24	0.32	0.23	0.31
ETPO					1	0.36	0.49	0.34	0.29	0.27	0.09	0.17	0.24	0.17	0.22
ETOV						1	0.29	0.17	0.14	0.17	0.19	0.18	0.31	0.27	0.37
ETFF							1	0.39	0.39	0.28	0.16	0.20	0.24	0.09	0.19
ETWB								1	0.56	0.48	0.18	0.21	0.23	0.08	0.29
ETWF									1	0.49	0.25	0.20	0.25	0.07	0.27
ETWR										1	0.23	0.33	0.19	0.17	0.33
ETWW											1	0.29	0.37	0.36	0.33
ETCT												1	0.24	0.34	0.38
ETWG													1	0.40	0.40
ETBR														1	0.45
ETOM															1

APPENDIX G

Variable correlations among respondents with non-missing data

	AGES	ABNB	RACE	EDAT	EMPY	ACCU	BFFV	MFVG	FVDC	CCFJ
AGES	1	0.04	-0.14	-0.07	0.03	-0.22	0.15	0.14	0.02	-0.01
ABNB		1	-0.11	0.13	0.05	-0.04	0.00	-0.03	-0.04	-0.05
RACE			1	0.01	0.04	0.18	-0.04	-0.05	0.07	0.09
EDAT				1	0.22	0.34	-0.08	-0.01	-0.04	-0.12
EMPY					1	0.19	-0.07	-0.04	-0.03	-0.07
ACCU						1	-0.18	-0.12	0.02	-0.03
BFFV							1	0.59	0.29	0.19
MFVG								1	0.32	0.15
FVDC									1	0.45
CCFJ										1

Appendix G – *Continued*

	ASBV	SSBV	ETFR	ETVG	ETPO	ETOV	ETFF	ETWB	ETWF	ETWR	ETWW	ETCT	ETWG	ETBR	ETOM
AGES	-0.01	-0.15	0.00	0.01	-0.05	0.08	-0.13	-0.08	-0.07	0.00	0.03	0.12	0.06	0.04	0.08
ABNB	0.03	-0.01	-0.05	-0.03	0.00	-0.04	-0.02	-0.06	0.00	-0.03	0.01	-0.03	-0.02	-0.02	-0.01
RACE	0.02	0.09	0.08	0.05	0.06	0.03	0.08	0.08	0.07	0.09	0.03	-0.05	0.00	0.01	0.02
EDAT	-0.01	-0.01	-0.08	0.00	-0.03	0.01	-0.03	-0.03	-0.03	-0.04	-0.09	-0.27	-0.01	-0.10	-0.06
EMPY	0.05	0.02	-0.06	-0.01	0.01	0.00	0.05	-0.01	-0.01	-0.02	-0.02	-0.15	-0.05	-0.04	-0.01
ACCU	0.06	0.20	-0.04	0.07	0.06	0.01	0.19	0.17	0.11	-0.02	-0.03	-0.43	-0.02	-0.10	-0.06
BFFV	-0.03	-0.09	0.30	0.23	0.08	0.20	-0.03	0.01	0.02	0.09	0.05	0.16	0.13	0.08	0.13
MFVG	-0.02	-0.10	0.26	0.29	0.09	0.28	-0.05	-0.02	-0.02	0.09	0.06	0.11	0.13	0.10	0.14
FVDC	0.16	0.19	0.81	0.86	0.61	0.77	0.35	0.30	0.29	0.36	0.28	0.25	0.44	0.31	0.39
CCFJ	0.15	0.12	0.45	0.38	0.26	0.27	0.15	0.21	0.18	0.24	0.21	0.20	0.27	0.21	0.26

Appendix G – *Continued*

	ASBV	SSBV	ETFR	ETVG	ETPO	ETOV	ETFF	ETWB	ETWF	ETWR	ETWW	ETCT	ETWG	ETBR	ETOM
ASBV	1	0.35	0.10	0.14	0.18	0.11	0.28	0.18	0.16	0.09	0.12	0.10	0.10	0.12	0.04
SSBV		1	0.14	0.14	0.27	0.09	0.44	0.31	0.30	0.17	0.07	0.04	0.06	0.06	0.03
ETFR			1	0.58	0.31	0.41	0.21	0.20	0.20	0.23	0.20	0.21	0.32	0.21	0.29
ETVG				1	0.38	0.57	0.25	0.22	0.20	0.25	0.21	0.16	0.35	0.23	0.30
ETPO					1	0.43	0.51	0.35	0.36	0.36	0.26	0.24	0.35	0.27	0.30
ETOV						1	0.23	0.22	0.18	0.31	0.24	0.19	0.36	0.28	0.32
ETFF							1	0.39	0.37	0.28	0.19	0.11	0.20	0.20	0.19
ETWB								1	0.64	0.46	0.22	0.15	0.21	0.19	0.24
ETWF									1	0.49	0.26	0.16	0.22	0.19	0.21
ETWR										1	0.24	0.31	0.30	0.30	0.38
ETWW											1	0.26	0.34	0.30	0.25
ETCT												1	0.31	0.26	0.26
ETWG													1	0.33	0.40
ETBR														1	0.40
ETOM															1

APPENDIX H

Difference among correlations between data subsets

	AGES	ABNB	RACE	EDAT	EMPY	ACCU	BFFV	MFVG	FVDC	CCFJ
AGES	0	0.00	0.02	0.00	-0.01	0.04	0.01	0.00	0.00	0.00
ABNB		0	0.00	-0.02	0.00	-0.01	0.00	-0.01	0.00	0.00
RACE			0	-0.01	0.00	0.00	0.00	0.00	0.01	0.00
EDAT				0	-0.05	-0.08	0.00	0.00	0.00	0.01
EMPY					0	-0.06	-0.03	-0.02	-0.02	-0.01
ACCU						0	-0.01	0.00	0.00	0.00
BFFV							0	-0.02	-0.02	0.00
MFVG								0	0.01	0.01
FVDC									0	0.03
CCFJ										0

Appendix H – *Continued*

	ASBV	SSBV	ETFR	ETVG	ETPO	ETOV	ETFF	ETWB	ETWF	ETWR	ETWW	ETCT	ETWG	ETBR	ETOM
AGES	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	-0.01	0.00	0.00	0.01	0.00	0.00	0.01
ABNB	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
RACE	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
EDAT	0.00	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.04	0.00	0.00	0.00
EMPY	0.00	0.00	-0.03	-0.01	0.00	-0.01	0.00	0.00	-0.01	-0.01	-0.01	-0.05	-0.01	-0.01	-0.01
ACCU	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.03	0.01	-0.01	-0.01	-0.01	0.00	-0.01	-0.01
BFFV	0.00	0.00	0.02	-0.04	0.01	-0.03	0.00	0.00	0.00	0.00	-0.02	-0.03	-0.01	-0.02	0.00
MFVG	0.00	0.00	0.03	-0.02	0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.02	0.00	-0.02
FVDC	-0.03	0.00	-0.02	0.03	0.03	0.02	-0.03	0.04	0.05	0.06	0.03	-0.02	0.04	0.00	-0.02
CCFJ	-0.02	-0.01	0.03	0.04	0.01	0.01	-0.03	-0.01	-0.01	0.02	0.01	-0.02	0.03	-0.02	0.01

Appendix H – *Continued*

	ASBV	SSBV	ETFR	ETVG	ETPO	ETOV	ETFF	ETWB	ETWF	ETWR	ETWW	ETCT	ETWG	ETBR	ETOM
ASBV	0	0.04	-0.01	-0.02	-0.01	-0.03	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00
SSBV		0	0.01	0.00	-0.01	0.00	-0.03	0.03	-0.01	0.02	0.00	0.00	-0.01	0.00	0.00
ETFR			0	0.00	-0.01	0.00	-0.01	0.03	0.03	0.02	0.01	-0.01	0.00	-0.02	-0.01
ETVG				0	0.05	0.02	-0.03	0.02	0.02	0.04	0.00	-0.03	0.02	0.00	-0.01
ETPO					0	0.05	0.02	0.01	0.05	0.06	0.06	0.03	0.07	0.04	0.04
ETOV						0	-0.03	0.02	0.01	0.07	0.02	0.00	0.03	0.01	-0.04
ETFF							0	0.00	-0.01	0.00	0.01	-0.03	-0.02	0.03	0.00
ETWB								0	**0.09***	-0.02	0.02	-0.02	-0.01	0.03	-0.03
ETWF									0	0.00	0.01	-0.01	-0.01	0.03	-0.01
ETWR										0	0.00	-0.01	0.05	0.06	0.04
ETWW											0	-0.01	-0.02	-0.04	-0.04
ETCT												0	0.04	-0.05	-0.07
ETWG													0	-0.05	0.00
ETBR														0	-0.05
ETOM															0

Note: * = Maximum absolute difference in Correlation Coefficients

APPENDIX I

Socio - demographic characteristics of respondents

Variable	M = 27.8	SD = 7.1
	N	%
Age (Years)		
18 – 20	304	9.1
20 – 25	933	28.0
26 – 30	872	26.1
31 – 35	654	19.6
36 – 40	389	11.7
41 – 45	130	3.9
46 – 50	28	0.8
> 50	26	0.8
Level of Education		
1 – 6 years	253	7.9
7 – 9 years	469	14.6
10 – 12 years	688	21.4
High School Graduate	857	26.7
G.E.D.	176	5.5
Some college	529	16.5
Associate or Technical Degree	162	5.0
Bachelor's Degree or Higher	76	2.4
Employment		
Unemployed	2,237	67.5
Part-time Employment	442	13.3
Full-time Employment	633	19.1
Race/Ethnicity		
White Hispanic	2,923	87.6
Black Hispanic	102	3.1
Native American Hispanic	255	7.6
Pacific Islander Hispanic	33	1.0
Asian Hispanic	23	0.7
Place of Residence (Non-Border - Border)		
Non-Border	2,140	71.2
Border	865	28.8

APPENDIX J

Levels of acculturation of respondents

Variable	N	%
Survey Language		
English	1,907	57.2
Spanish	1,429	42.8
Language Spoken at Home		
English	921	27.6
Spanish	1,252	37.5
Spanish & English	1,163	34.9
Level of Acculturation		
Low	1,118	33.5
Bicultural	1,329	39.8
High	889	26.6

APPENDIX K

Height, weight and BMI status of respondents

Variable	Mean	SD	N	%
Height (inches)	62.7	3.0	2,797	100
Weight (pounds)	157.6	29.1	2,440	100
BMI	28.4	5.3	2,440	100
Weight Status by CDC Categories				
Underweight			7	0.3
Normal weight			724	29.7
Overweight			800	32.8
Obese			616	25.2
Extremely Obese			293	12

APPENDIX L

Nutrition behaviors among respondents

Item	N	%
Daily Fruit and Vegetables Consumption (M=3.61; SD=2.95)		
0	21	0.6
>0 and <5	2,337	70.1
5 or more	904	27.1
Fruit Juice (M=1.27; SD=1.17)		
None	243	7.3
1 to 3 per week	828	24.8
4 to 6 per week	447	13.4
1 per day	599	18
2 per day	645	19.3
3 per day	370	11.1
4 or more per day	204	6.1
Artificially Sweetened Beverages (M=0.55; SD=0.85)		
None	1,405	42.1
1 to 3 per week	807	24.2
4 to 6 per week	229	6.9
1 per day	482	14.4
2 per day	255	7.6
3 per day	102	3.1
4 or more per day	56	1.7
Sugar Sweetened Beverages (M=0.84; SD=1.09)		
None	814	24.4
1 to 3 per week	999	29.9
4 to 6 per week	351	10.5
1 per day	483	14.5
2 per day	331	9.9
3 per day	200	6
4 or more per day	157	4.7

Appendix L – *Continued*

Item	N	%
Fruit (M=1.32; SD=1.19)		
None	254	7.6
1 to 3 per week	703	21.1
4 to 6 per week	508	15.2
1 per day	590	17.7
2 per day	666	20
3 per day	369	11.1
4 or more per day	243	7.3
Vegetables (M=1.13; SD=1.10)		
None	233	7
1 to 3 per week	906	27.2
4 to 6 per week	545	16.3
1 per day	661	19.8
2 per day	546	16.4
3 per day	265	7.9
4 or more per day	180	5.4
Potatoes (M=0.46; SD=0.64)		
None	677	20.3
1 to 3 per week	1,647	49.4
4 to 6 per week	448	13.4
1 per day	347	10.4
2 per day	136	4.1
3 per day	47	1.4
4 or more per day	33	1
Other Vegetables (M=0.69; SD=0.87)		
None	514	15.4
1 to 3 per week	1,256	37.6
4 to 6 per week	547	16.4
1 per day	480	14.4
2 per day	280	8.4
3 per day	113	3.4
4 or more per day	76	2.3

Appendix L – *Continued*

Item	N	%
French Fries (M=0.42; SD=0.64)		
None	962	29.9
1 to 3 per week	1,399	43.5
4 to 6 per week	310	9.6
1 per day	344	10.7
2 per day	126	3.9
3 per day	51	1.6
4 or more per day	27	0.8
White Bread (M=0.52; SD=0.77)		
None	950	28.9
1 to 3 per week	1,182	36
4 to 6 per week	464	14.1
1 per day	387	11.8
2 per day	167	5.1
3 per day	83	2.5
4 or more per day	54	1.6
White Flour Tortillas (M=0.47; SD=0.74)		
None	1,061	32.4
1 to 3 per week	1,210	37
4 to 6 per week	417	12.7
1 per day	322	9.8
2 per day	140	4.3
3 per day	78	2.4
4 or more per day	45	1.4
White Rice (M=0.42; SD=0.62)		
None	809	24.5
1 to 3 per week	1,547	46.9
4 to 6 per week	463	14
1 per day	305	9.3
2 per day	93	2.8
3 per day	43	1.3
4 or more per day	36	1.1

Appendix L – *Continued*

Item	N	%
Whole Wheat Tortillas (M=0.28; SD=0.63)		
None	2,065	64
1 to 3 per week	623	19.3
4 to 6 per week	154	4.8
1 per day	205	6.4
2 per day	106	3.3
3 per day	45	1.4
4 or more per day	27	0.8
Corn Tortillas (M=1.01; SD=1.08)		
None	434	13.2
1 to 3 per week	979	29.8
4 to 6 per week	504	15.4
1 per day	408	12.4
2 per day	575	17.5
3 per day	257	7.8
4 or more per day	124	3.8
Whole Grain Bread (M=0.67; SD=0.85)		
None	707	21.6
1 to 3 per week	1,022	31.3
4 to 6 per week	540	16.5
1 per day	553	16.9
2 per day	278	8.5
3 per day	97	3
4 or more per day	69	2.1
Brown Rice (M=0.23; SD=0.52)		
None	2,021	62.1
1 to 3 per week	737	22.7
4 to 6 per week	186	5.7
1 per day	211	6.5
2 per day	55	1.7
3 per day	22	0.7
4 or more per day	21	0.6
Oatmeal (M=0.39; SD=0.61)		
None	1,202	36.5
1 to 3 per week	1,140	34.7
4 to 6 per week	344	10.5
1 per day	448	13.6
2 per day	93	2.8
3 per day	31	0.9
4 or more per day	31	0.9

Appendix L – *Continued*

Item	N	%
Buy fruits and vegetables		
Never	14	0.4
Rarely	80	2.4
Sometimes	483	14.6
Often	1,109	33.6
Always	1,615	48.9
Prepare meals with F & V		
Never	52	1.6
Rarely	129	3.9
Sometimes	812	24.8
Often	1,109	33.8
Always	1,177	35.9
Type of vegetables purchased		
Fresh	2,644	82.3
Canned	317	9.9
Frozen	192	6
Dried	58	1.8
Type of fruits purchased		
Fresh	3,046	91.3
Canned	82	2.5
Frozen	20	0.6
Dried	69	2.1

APPENDIX M

Food consumption pattern among respondents

Item	N	%
Food Consumption Pattern		
Non-Healthy Pattern	2,358	70.7
Healthy Pattern	904	27.1

APPENDIX N

Food consumption patterns among respondents, fruit juice excluded

Item	N	%
Food Consumption Patterns		
Non-Healthy Pattern	2,709	81.2
Healthy Pattern	553	16.6

VITA

Nelson Alberto Atehortua received his MD degree from The University of Cartagena, Colombia in 1992. He also attended The Northern University in Barranquilla, Colombia in 1994 to follow a post-graduate program in Health Services Management where he received his degree as Specialist (MA equivalent) in 1996. He also attended the Department of Public Health at Western Kentucky University in August 2004 and received his Master in Public Health (MPH) degree in December 2006. He entered Texas A&M University Doctoral Program in Health Education at the Department of Health and Kinesiology in 2006 and is graduating in August 2012.

Dr. Atehortua has held positions at the regional, national and international level including two tours of duty for the World Health Organization as Advisor for Health Systems and Services for the Eastern Caribbean Counties based in Bridgetown, Barbados; and as the Regional Coordinator of the Bloomberg Initiative to Reduce Tobacco Use based in Washington, DC.

His research interests include epidemiologic, social determinants, genomics and personalized medicine associated with cancer and chronic non-communicable diseases; acculturation, health disparities; quality of care and access to health systems. He plans to follow a career as faculty and researcher and publishing on these topics, focusing on Hispanic/Latino population. Dr. Atehortua may be reached at 332-C Blocker Building, mail stop 4243 TAMU, College Station, TX. 77843-4243. His email is nelson.atehortua@gmail.com.